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A Six-Story Continuous Foundry Building

Details of the New Structure of the Ford Motor Company and Other Plant Extensions—Supervision of Machine Equipment

BY OLIVER J. ABELL

Twelve months ago the Ford Motor Company was building and shipping motor cars at the rate of 500 a day. A description of the plant and the methods with which this sufficiently astonishing production was accomplished was presented in *The Iron Age* of June 6 and 13, 1912. Within the period of one year the output has been increased to an average of 1000 cars in each day of 9 hr., and the plant itself, including equipment, is still as much in a transition period of growth as it was then. A year ago the buildings completed and projected totaled a floor area of 1,270,000 sq. ft., or about 29 acres. The new buildings, construction of which has now been authorized, will increase that total to 44 acres of floor area, the additional 14½ acres being divided into 36,112 sq. ft. of office space, 530,400 sq. ft. in three manufacturing buildings and 67,600 sq. ft. in craneways. All of this new construction is at the Detroit plant and does not include the branch assembly plants being erected in a number of cites. The expansion in buildings is being paralleled by the buying of much additional machinery and larger quantities of materials. The equipment of the machine shop already includes over 5000 individual tools. Intensively, the increased production has been accompanied by marked refinements in the handling of materials. Throughout the plant, in the stockrooms and in the operating departments, pieces are no longer tallied by individual count but are handled in crates, boxes or cartons of 50. In the coreroom, for example, for a certain core a tray is made which will hold just 50 and for other cores similar trays are made. In the stockroom, bins have been eliminated and shippers are required to supply all small parts in boxes or cartons which are piled up on the floor. By reason of this change the cost of handling stock mate-

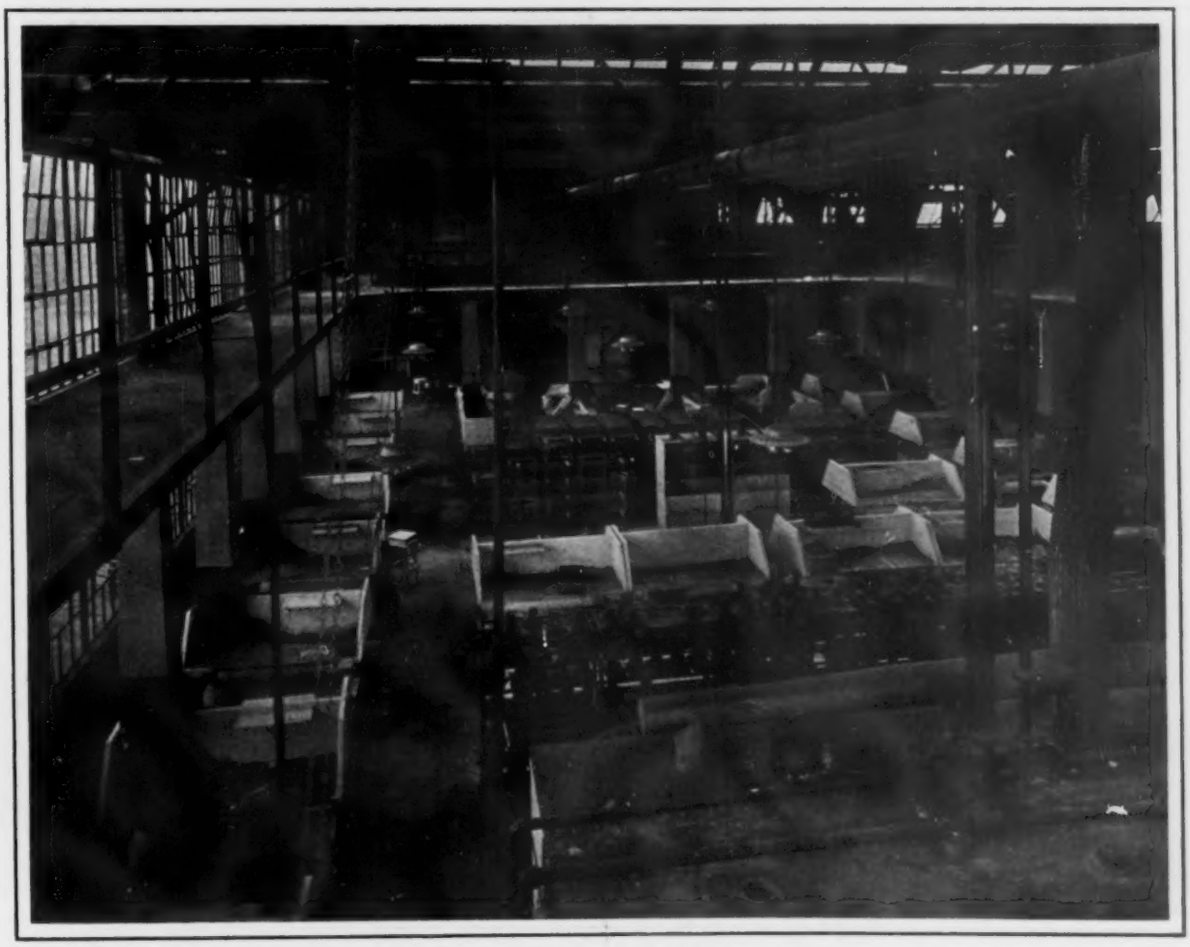


Fig. 1—General View of the Foundry Coreroom Showing the Arrangement of the Core Making Benches, Sand Spouts and Sand Gallery

Fig. 2—The Sand Storage Hopper in the Coreroom and the Sand Mixer

rials is now slightly less than the expense involved in handling half the quantity of stock a year ago.

With reference to machine equipment the tendency has been toward greater specialization in the design of the machines for milling, drilling, tapping and grinding. Of this more detailed mention is made later. In addition to the installation of increased machining capacity, two other departments have contributed to the greater production, namely, the foundry and pressed steel departments.

It may be said that the Ford foundry has been an experiment to a greater extent than is true of any other part of the plant. In the beginning, the castings were made at a nearby town on a contract arrangement. That foundry was subsequently purchased and moved to Detroit and the work put on a piece rate basis. The castings were still costing too much and the piece rate basis was discarded and straight time substituted under a more strenuous supervision from the standpoint of production. By reason of a proper arrangement and division of tasks the last basis of operation began to demonstrate its effectiveness. The foundry as described a year ago was at that stage of development. Since that time it has been doubled in floor area and made continuous in operation. The latest stage of development is to be provided for in one of the new buildings for which plans are being completed and constitutes a departure from previous practice, entirely unique.

The New Foundry Building

This new building is to be about 850 ft. long and six stories in hight. It will be arranged to make the manufacturing processes from raw materials to completely machined castings continuous and consecutive within one building. The sixth floor will be a cupola charging floor; the fifth floor the core making floor; the fourth floor will be a continuous molding and pouring floor; the third floor will be occupied exclusively by tumbling barrels and grinding machines for cleaning the castings; on the second floor the metal pattern making and light machining will be provided for, and on the first floor the heavier cast-iron machining. Raw materials for the cupolas will be elevated to the sixth floor charging platforms, the coke from a track hopper by a bottom dump bucket hung from a crane and the pig iron and limestone in industrial buggies on ele-

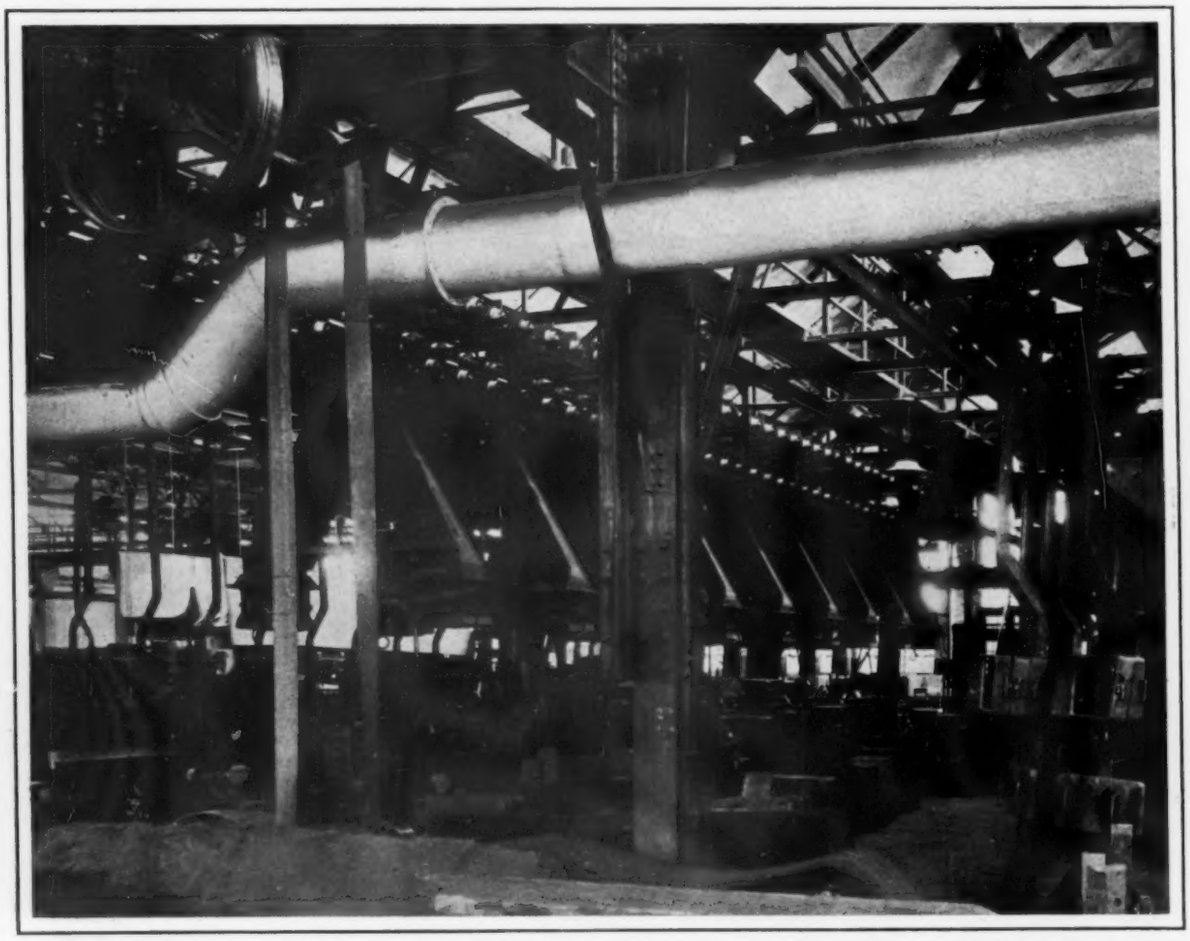


Fig. 3—View of the Continuous Machine Showing the Central Row of Sand Spouts and Molding Machines with the Carriers on Either Side. The Overhead Sand Conveyor is Also Shown

vators. An overhead hopper is to be provided for coke storage above the charging platform with bottom gates that will discharge the coke directly into the cupolas. The pig iron and limestone will be charged directly from the buggies in which they are elevated.

Conveyors and gravity slides enter largely into the handling of the materials in process. The cores will be brought down from the fifth floor to the molding floor below on a vertical chain elevator with horizontal stake flights. From these vertical elevators the cores will be placed on belt conveyors which traverse the molding floor, passing the floors on which the molds are made, so that the workman who sets the cores has but to lift them from the conveyor to the mold. This conveyor returns on the floor below and carries the castings which have come down from the shaking out tables on the molding floor, via a gravity slide, along to the tumbling barrels. Opposite each tumbling barrel the conveyor is to be equipped with a diverting gate arranged to turn the castings into any particular barrel desired. From the tumblers the castings slide across on inclined tables to the grinding machines, from which they are dropped into spiral slides which deliver them to the machining floors below.

Fig. 4—One End of One of the Continuous Carrier Units Showing the Design of the Suspended Platforms and the Manner in Which the Empty Flasks and Weights are Hung After Shaking Out

The arrangement of each floor corresponds in the longitudinal location of equipment to the arrangement of the continuous molding machine units on the molding floor. For the various kinds of castings, cylinders, cylinder heads, pistons, etc., individual units will be provided with cupolas between each two units and in other respects will be self-contained. The continuous equipment will be generally similar to the units now installed in the present foundry. The design of this building provides an especially stiff construction, primarily, to eliminate vibration which, if excessive, would greatly increase the number of bad castings where the molding floor is so high in the building. The weight of the cupolas, approximating 58 tons when charged, also requires unusual construction, and the plans provide for the cupolas being directly over the side wall foundation of the building.

The foundry now operating is 148 ft. wide and 400 ft. long. In this entire floor area there are no partitions, the coreroom, molding floors and cleaning rooms being continuous. The coreroom and foundry as they are now equipped have been in a measure a laboratory of experiment leading up to the proposed new building arrangement. A number of interesting devices are included in the coreroom, a general view of which is shown in Fig. 1. The core making benches are placed around the four sides of the room, as shown in the illustration, and the core ovens and racks for holding the cores in the intervals before and after baking occupy the center of the room. For bringing the sand to the core makers' benches a gallery has been built extending all around the room directly above the benches, and from this gallery spouts are dropped directly over the bench. The sand which is stored in the bins that parallel the foundry building, a description of which arrangement was given in a previous article, is transferred by a 3-ton gantry crane to a hopper built into the wall of the building so that the discharge foot valves deliver the sand directly into buggies on the gallery above mentioned. A view of this hopper, together with the core sand mixers, is given in Fig. 2, and it is apparent that, with the greatest portion of the hopper inside of the building, even in severe weather the sand runs freely and does not freeze. The buckets into which this sand is loaded are

Fig. 5—Partial View of the Cupola Installation and a Portion of Endless I Beam Trolley Loop on Which Hot Metal is Handled to the Continuous Carriers

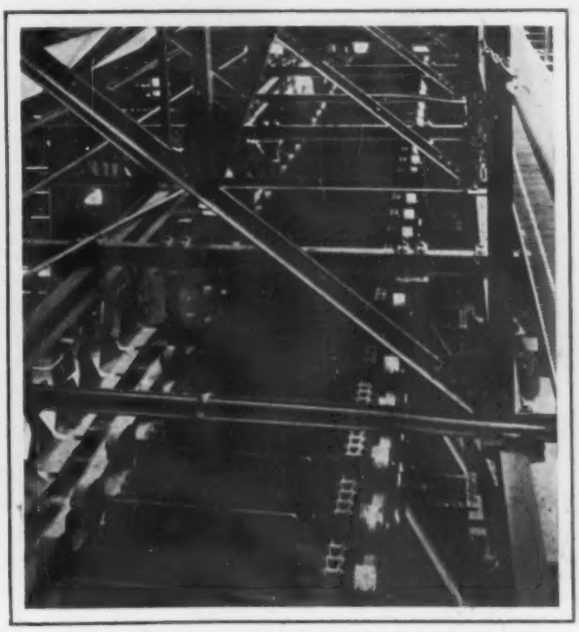


Fig. 6—A Detailed View of the Overhead Scraper Type Sand Conveyor of the Sand Handling Machine

Fig. 7—View Looking Along the Cleaning and Grinding Side of the Foundry. From the Grinding Machines the Finished Castings Slide Out Through the Wall Chutes Shown to the Loading Platform Illustrated in Fig. 8

made to fit into ports in the floor on the gallery, which ports are the upper end of the sand spouts.

The type of core oven used was built by the Ford Company in its own shops. These ovens have the revolving doors arranged with a table on each side of the steel door plate, so that while the cores in the oven are baking, green cores may be loaded on the shelves preparatory to being swung into the oven. The core ovens are gas heated, gas having been substituted for fuel oil throughout the plant. As in all other departments of the plant, no accumulation of materials is permitted, under ordinary conditions, and the steel pipe shelves offer sufficient storage capacity for the green and baked cores in transit. These trays are marked for the particular cores for which they are to be used and are made with legs of sufficient hight so that they can be piled one on the other when loaded with cores. The excellent lighting of the coreroom, attributable to the use of Fenestra sash in the sidewalls and the roof panels with Drouvé operating mechanism, is very apparent.

Fig. 8—The Delivery Platform Which Extends the Full Length of the Foundry and is Traversed by an Overhead Electric Trolley that Delivers Castings Directly to the Machine Shop

Continuous Pouring Machines

At the present time the foundry floor space is about evenly divided between floor pouring and continuous machine pouring, the former operation being essentially as continuous as the latter. The one half is divided into eight cylinder floors arranged in two parallel rows of four floors, with sufficient space between the rows for the molding machines, upon which the cylinder molds are made up. The schedule of work provides for the making up of 90 cylinder molds per day on each floor, which number is frequently exceeded, as on May 13, when a total of 878 cylinders was cast. The molds are laid down on the floor in parallel rows of from seven to ten. The operator of one machine makes the drag half of the mold continuously, and a row of drag molds are first laid down following which the venting, blacking-up and skin drying of the mold is completed. The port cores, housing cores, jacket cores, barrel and round cores, and finally the box cores, are set in consecutive order. The mold is made so that the port cores are set into it and cannot be misplaced, which is also true of the housing cores. The other cores are set by gauge. The parting is then put on the mold, and by this time copes for all of the molds are made and are put on. The locking up and gating of the molds follows. Pouring follows immediately, or with a very short interval of delay. A watch held on the various operations in making up the cylinder molds showed that 5 min. was required for making and setting down the drag; another 5 min. for venting, parting, blacking-up and setting the port cores, and 1¼ min. for skin drying the mold. The setting of housing cores in seven molds and placing chaplets required but 1½ min., and adjusting these cores with a level gauge an additional 3 min. Both barrel cores were placed in each mold in an elapsed time of about 1 min., while the adjusting of these cores to gauge required about 1¾ min. for the seven molds. The making of the cope took approximately 6 min., and less than ½ min. to put on the drag. The locking up and gating of the seven molds required about 7 min.

Each row of cylinder floors is located directly under a craneway spanned by a 2-ton, floor-operated crane carrying an electric hoist. The iron is poured directly from 1000-lb. ladles hung from these cranes and into which the iron is run direct from the cupola. The craneways extend to the end of the foundry and over the shaking out tables. Almost immediately after the mold is poured the flasks are

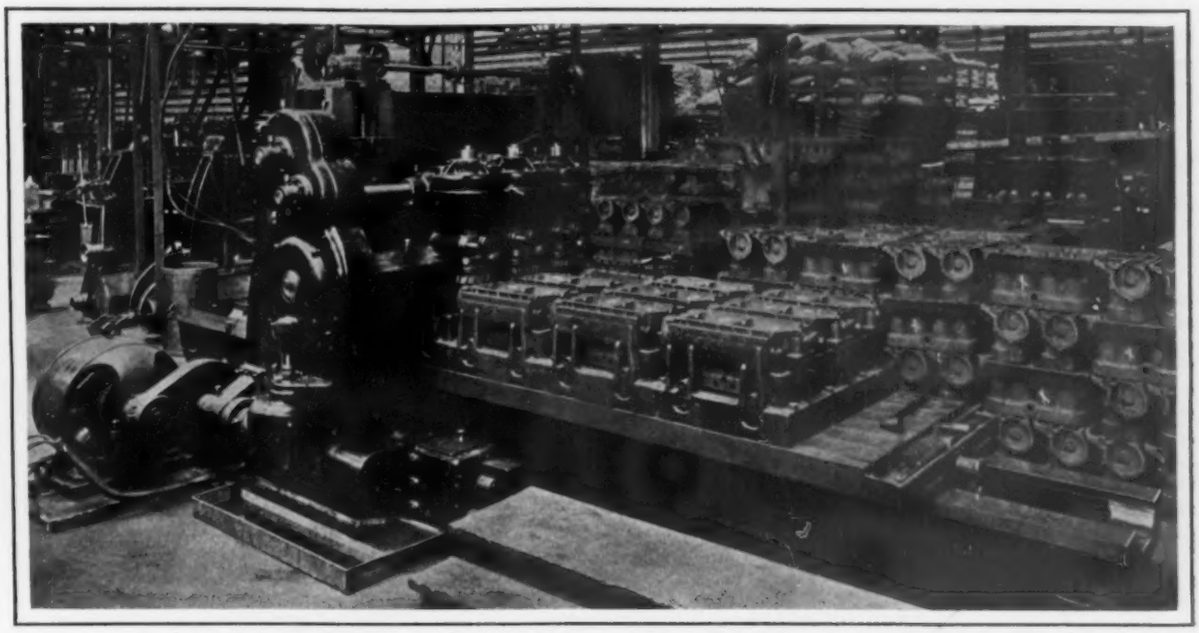


Fig. 9—A Portion of the Cylinder Milling Machine Group on Which Over 1000 Cylinders Are Surfaced Daily

picked up in pairs by a second crane and carried out. The cylinder castings are shaken out in most instances when still red hot and are laid out in the air to cool in the less valuable yard space. It is an interesting fact that from the time the sand is put into the drag mold to be rammed up until the complete cylinder is laid out in the yard the elapsed time is approximately 1 hr., and frequently less than that, though sometimes running up to 1½ hr. on the least favorable portions of the molding floor. Operating at this rate it is not altogether surprising that 125 tons of iron is melted in this foundry daily, but it is exceedingly creditable that out of the 878 castings mentioned above only 52 were bad. The average of bad castings from month to month varies between 10 and 12 per cent. In the new foundry to be built the cylinders will be poured on continuous machines in the same manner as other castings are poured in the present foundry.

There are in operation two continuous units, and a third is to be installed in the near future. The general character of these machines is illustrated in Figs. 3 and 4. Each unit consists of twin flask carriers with parallel axes and located one on each side of a double row of 18 stripper molding machines to which the sand is spouted down from the sand conveyor immediately overhead. The flask carriers, as well as the sand elevator and conveyor installation, were built from designs of the Ford Motor Company. Each of the carriers consists of 39 platforms or trays, suspended at a hight of 16 in. above the floor by a like number of steel angle hangers, hung from an endless trolley 12 ft. above the floor. This trolley is actuated by and travels around two 10-ft. sprockets, spaced 36 ft. center to center and mounted on supporting structures so as to rotate in a horizontal plane. Thus the flasks carried on these platforms travel in an elliptical path, the long axis of which is 46 ft. and the short axis 10 ft.

Sand Handling Machinery

The sand handling equipment for each unit has capacity for handling approximately 40 tons of sand per hr. continuously. The general arrangement of this apparatus with relation to the molding machines and to the I-beam trolley upon which the suspended bull ladle brings the hot metal from the cupola to the carriers is shown in Fig. 5. New sand is fed into the machine by a screw conveyor from a floor opening, being delivered at the foot of a bucket elevator, centrally placed at one end of the unit. Together with the return sand from the shaking out tables and the waste from the molding machines, the new sand is delivered by the elevator to overhead screens and mixers from which the sand passes by gravity to the horizontal conveyor, from which the sand drops through spouts to the molding machines below. A view of this conveyor is shown in Fig. 6. It consists of a trough through which a steel bushed chain carrying a steel scraper rigidly attached at every sixth link pulls the sand at the rate of about 32 ft. per min. In the present arrangement the excess sand flows down a spout to a separate conveyor under the floor, which returns to the foot of the elevator, the upper chain conveyor returning idle. This design is to be revised so that the scraper conveyor will make the complete loop, returning below the floor with the excess sand. The waste sand from the molding machines will fall through floor gratings to the return conveyor, and is carried back with the excess sand from above.

The shaking out tables are at the same end of the machine as the sand elevator, one for each carrier. The sand shaken out from the flasks falls through the table grids on horizontal belt conveyors which carry the sand from the tables to a central floor hopper through which it passes to the sand return conveyor and to the sand elevator. The empty flasks after being shaken out are hung on pegs on

Fig. 10—View of the Craneway in the Pressed Steel Department in Which the Heavy Presses Are Located

the hanger of the same platform from which they were taken. From the shaking out tables the direction of travel of the carriers is toward the hot metal end, passing the molding machines on the inside of the loops. Here the empty flasks are taken off and new molds put on the platforms. The pouring crew works on the outside, pouring against the direction of motion to secure steadier pouring, the travel of the carriers on this side being away from the hot metal end and toward the shaking out tables.

The melting equipment of the foundry consists of 4 Newton cupolas, 3 of them 60 in. in diameter and one 72 in. As much as 61 tons has been obtained from one of the 60-in cupolas in one day. Until the 72-in. cupola was installed very recently the three others were operated every day. The first one was started at seven in the morning, the second at ten, and the third at twelve. The bottom was dropped in the first one at two o'clock, and it was required to be ready for service again the next morning at seven. For a time the cylinders were cast from an iron of different analysis than the other castings, but it was found that this specialization involved a greater expense than the making of all of the castings out of the one iron. In one day approximately 118½ charges of 1 ton each are made. The average melting ratio is ten to one.

Machining the Cylinders and Pistons

During the past year the machine equipment has been rearranged and increased so that the machine shop now occupies the new building just being finished in June, 1912, as well as the former floor space. Scarcely a single machine is where it was a year ago. Many tools have been added for each of the various machining operations, automatic lathes, grinding, screw, gear cutting and drilling machines, but the most interesting expansion has been made in the equipment for machining the cylinders and pistons. The finishing of the top and bottom of the cylinder, the water jacket boss on one side, the intake and exhaust manifold bosses on the other side, and the crankshaft bearings are operations performed on production milling machines of special design, shown in Fig. 9. The cylinder heads are also milled on similar machines.

The milling of the crank case flange and the crankshaft bearings of the cylinder is simultaneous on the one machine. The table and fixtures of this milling machine accommodate 15 cylinders at a time, arranged in three rows of five each. The machine is equipped with three vertical spindles on the front of the housing, fitted with face milling cutters, and also a horizontal spindle on the rear of the housing. On this horizontal spindle three special cutters formed to the finished outline of the shaft bearings are carried. The three cutters, front and rear, correspond to the three rows of cylinders. The face cutters sweep the flanges, followed by the special cutters which mill out the bearings. Similarly the cylinder head joint and the cylinder bosses on each side are finished simultaneously on a milling machine equipped with a horizontal spindle in front of the housing and three vertical spindles at the back of the housing. The horizontal spindle carries six cutters in pairs for facing both sides of the cylinders in each row. The vertical spindle cutters follow, sweeping the tops of the cylinders for the head joint.

For the above four operations there are 10 milling machines, six for the bottoms and four for the tops. The relative number of machines for each job is determined by the machining time, the milling of the crank case flange and shaft bearing requiring about 8 min. as compared with 5¼ min. for the top and sides. Thus the 10 machines provide for the milling of 135 cylinders per hr., and as the rough cylinders are set up on one end of the table while the others are being machined, the process is practically continuous and at a rate comfortably in excess of 1000 per day. The tables of the special milling machines for facing the ends of the cylinders accommodate 14 cylinders at a time. The cylinder heads are milled on a machine equipped with three vertical and two horizontal spindles, one of the latter on each side of the table. Correspondingly the fixture provides for mounting the heads in five rows, three on top and one on each side, with the faces of the heads vertical. There are six heads in each row, or thirty in all.

For the cylinder boring operation a special machine is now in service. This machine is unusually rigid and the

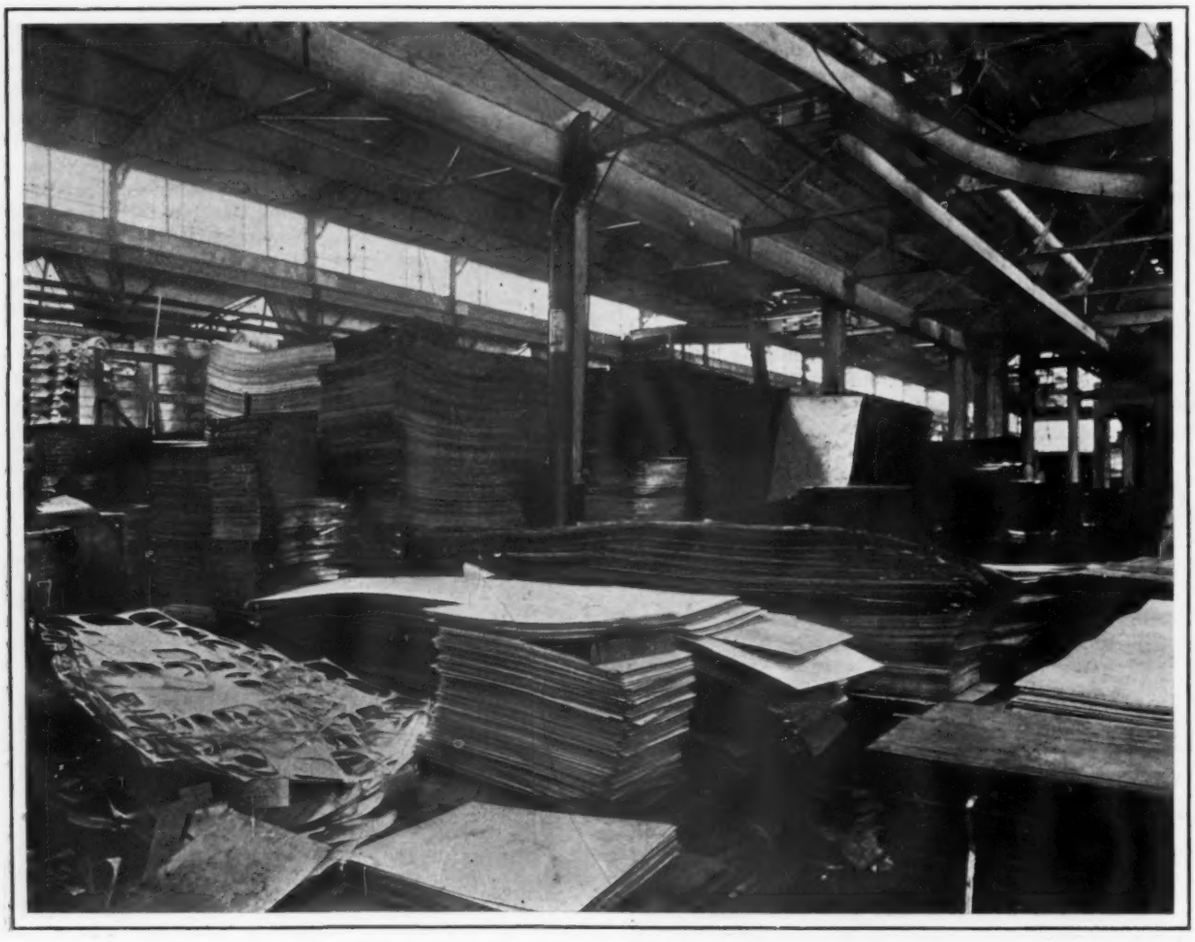


Fig. 11—A Portion of the Sheet Stock Carried for the Metal Stamping Department

boring spindles are designed without any adjustment, the machine being built exclusively for the present Ford cylinders. The work is completed in a roughing and finishing cut and is fed to the cutting tool by an upward table feed. Into the selection of a tool for the boring of the camshaft bearings, the question of economy of setting up time entered largely with the result that a double-end special lathe is used. In the previous article relative to this point, attention was called to the 45-spindle specially designed machine for drilling the cylinders. A battery of these drilling machines has now been put in service. A tool of similar design has also been developed for the multiple tapping of the numerous threaded holes in the cylinder for the cap screws, by which the head and manifold connections are secured. Several tools of this character are installed, each tapping in the neighborhood of 16 holes simultaneously.

The tool posts of a special semi-automatic multiple spindle vertical turning lathe for rough turning the pistons and cutting the piston ring seats carry tools for four operations, the sequence of which is provided for automatically. The first tool begins the turning of the piston circumference, feeding from the top down, during which operation the facing and chamfering of the top of the piston is also completed. At the completion of the turning operation that tool is raised to starting position by return feed, the head which carries the tools for forming the piston ring seats meanwhile feeding into position and completing that operation. The complete rough turning of the piston is thus completed in about 4½ min. and the machining of the four pistons which the machine accommodates is timed in rotation so that the actual cutting time is as nearly continuous as possible.

The installation of a pressed steel department at the Detroit plant has also been completed. Probably the most interesting feature of this plant is its capacity for consuming sheets of which 100 tons are formed daily into parts other than bodies or engine pans. A view of the stock of sheets carried is Fig. 10. At the time of the writer's visit, complaint was being lodged with the sheet makers filling the Ford contracts that deliveries had been such as to allow the stock to run down to only 3200 tons, a supply decidedly too small for comfort. For the several hundred different stamping operations various types of presses are installed. With the exception of the largest machines, which are individually driven, belt drive is used throughout in all departments of the plant. As shown in Fig. 11, the largest presses are located in a craneway spanned by a 5-ton crane and with a center aisle for stock. In the remainder of the department the materials are mechanically handled from trolleys. The arrangement of the presses is such that the presses performing consecutive operations are immediately adjacent. Thus the press operator of one machine lays down his finished piece conveniently, but where it may be picked up with equal convenience by the feeder of the following press.

Supervision of the Mechanical Equipment

Supervision of the machine equipment of the Ford plant is a duty of the engineering department. For the requirements of this supervision that department has outlined the following unusually pertinent suggestions. They are decidedly applicable to any shop:

1. Place original requisitions for machinery required after properly determining the adaptability of machine for operation intended.

2. Eliminate excess cost of machines by proper specifications with the idea of obtaining only such equipment or attachments as are absolutely required for the operation intended.

3. Maintain a complete record of machinery breakdowns, thus locating their weak points and preventing a recurrence by remedying them, and insisting on having weak points strengthened when purchasing more equipment of the same type.

4. Prevent the excess purchase of machinery, (*a*) by keeping record of machines made available by change in car design; (*b*) by properly timing and determining actual production of machines, and (c) by effecting proper distribution of machinery, making it necessary to work all machines to their full capacity.

5. Keep a record of the location of all machines, thereby (*a*) facilitating the tool drafting department in obtaining necessary dimensions for tooling and assigning such tools to proper machines without delay; (*b*) an aid to the purchasing department in determining any discrepancies between machines received and invoice specifications versus receiving record, and (*c*) ready access to any machine at all times for any reason whatever.

6. Keep a complete record of all machines purchased:
(*a*) Date when purchased.
(*b*) Whom purchased from.
(*c*) Date received in factory.
(*d*) Operation assigned to.
(*e*) Detail description with extra equipments.

7. Effect quick delivery of all machines by obtaining a promised delivery date and a systematic following up of it, with the idea of obtaining the most needed machines first.

8. Predetermine the most advantageous location for machines purchased, thereby facilitating prompt placing of the same when received in factory.

9. Supervise the proper serial number tagging of all machines, keeping a complete record of same.

10. Make a daily report of machines received.

11. Make a daily report of machines promised to be shipped to date.

12. Follow up all machine orders through the proper channels, thereby preventing any unnecessary holdup or delay in issuing the formal order to the manufacturers or dealers.

13. Order all special factory equipment and insure prompt delivery and installation of the same.

14. Keep a complete record of all operations in connection with T-parts, together with
(*a*) All machines assigned to each and every operation.
(*b*) Machine production per hour.
(*c*) Number of machines required for each operation.
(*d*) Schedule production in 8 hr.
(*c*) In connection with the operation sheets a record is maintained of the additional production required in order to keep up repair parts as required by the Service Department each month. It is necessary to do this in order to provide the additional machinery required to produce the added production.

15. All design changes as made by the Drafting Department are carefully gone over and machinery required by such changes is immediately anticipated. If the design effects the elimination of operations, such machines are made available and then assigned to other operations which are short of machines, or, if they cannot be used in the factory, they are sold or otherwise disposed of.

16. Arrange all T-part operations in groups requiring machinery of the same nature, style or make, thereby making it possible to ascertain whether or not all operations of the same capacity are being worked to the full production of the machine.

The International Harvester's Steel Plant

At Chicago, June 24, in the hearing in the Government suit for the dissolution of the International Harvester Company, the cause of that company's engaging in the manufacture of steel was inquired into.

Herbert F. Perkins, president of the Wisconsin Steel Company, a subsidiary, and who is also at the head of the purchasing department of the Harvester Company, explained that before the building of the steel plant the defendant company confronted two difficulties—first, the wide fluctuations in prices of iron and steel largely used in manufacturing harvesting machinery, and second, the delay in obtaining special parts. He said:

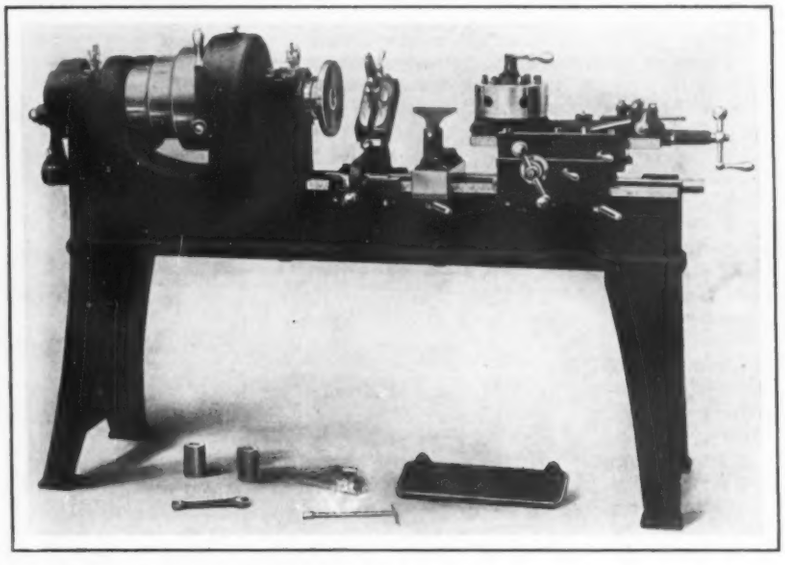
"We set the prices of our product at the beginning of the season and had to adhere to them, and it cut seriously into profits when iron and steel advanced on us. So we built a steel plant of our own where we could be assured of a consistent supply at an average price, and were able to obtain special parts as needed."

A railroad bridge 36,000 ft. long has just been completed in central Japan at Teuryugawa at a cost of $375,000. It has been constructed entirely of Japanese materials.

An 18-In. Universal Turret Lathe

For use in shops where general jobbing and repair work is handled and where only a small number of pieces are to be made, the Acme Machine Tool Company, Cincinnati, Ohio, has brought out a universal turret lathe, which is built with swings of 16 and 18 in. It is equipped with a geared friction head, chasing attachment and hand rest, and one of the special fields for which it is adapted is the tapping or threading of a small number of pieces which would not justify the cost of taps or dies. It is emphasized that for machining a large quantity of parts, the regular turret lathe will be found more serviceable.

The head which is cast solid with the bed has friction back gears. This gives two speeds for each step of the driving cone pulley for turning and threading or for turning different diameters on the same piece without stopping the machine. For the protection of the operator, all the gears are completely inclosed. Hammered crucible steel is used for the spindle, which is finished by grinding and is mounted in renewable bearings of babbitt metal.



The Recently Developed Acme Universal Turret Lathe Which Is Built with Swings of 16 and 18 In.

The round turret has six holes fitted with set screws, the arrangement of these holes being such that stock up to the full diameter of the hole can pass through the turret and thus permit short, stiff tools to be used in turning long work. The backward movement of the slide automatically indexes the turret and the locking bolt is placed at the front end of the slide and works in hardened and ground taper bushings. Swivel and set-over adjustments are provided for the turret slide, which is graduated for swiveling and has an adjustable stop. Both the lever and screw feed are furnished for the longitudinal movement of the slide. A ball crank handle and screw with a large micrometer dial to insure exact diameters provides the set-over movement of the turret which can be used in conjunction with the adjustable stop at the rear of the cross slide. If desired, the stop, which determines the center position of the turret can be shifted, so that it will pass beyond the center in either direction. Side wear is taken up by taper gibs on both sides of slide. The saddle rests on an adjustable taper base and a binder handle on the front of the saddle provides for positive and quick clamping of the saddle to the bed.

The chasing attachment is arranged for chasing straight or taper right and left hand threads, with the same leader and follower, three leaders and one three-prong follower for cutting 11½, 14 and 18 threads, being regularly furnished. The taper attachment is adjustable and graduated. As stated, the lathe is built with swings of 16 and 18 in., the larger size being the one illustrated.

The 16-in. lathe can be furnished with a plain head, in which case the floor space required and the weight are slightly reduced. The regular equipment of the lathe includes a spindle with external thread, a round universal turret fitted with set screws, a chasing attachment, a hand rest saddle with two hand rests, a tool tray, a countershaft and a set of wrenches. If desired, an automatic chuck, standard cut-off or forming rest or motor drive, can be supplied.

Williams & Co.'s Buffalo Drop Forging Plant

J. H. Williams & Co., manufacturers of drop forgings, Brooklyn, N. Y., have let a contract for the construction of the initial buildings of their Buffalo plant to the John W. Ferguson Company, Paterson, N. J., the steel work, amounting to 650 tons, being sublet to the Lackawanna Bridge Company, Buffalo. All the buildings contracted for will be of brick and steel construction, one story, with a total floor space of 87,500 sq. ft. The stock and finishing buildings will have saw-tooth roofs and the other buildings flat-decked roofs with monitors. Steel sash will be used in all the buildings. The forge shop will be laid out for about 36 hammers.

The capacity of the Buffalo plant will be nearly one-half that of the Brooklyn plant and the buildings are to be arranged with a view to future growth, so that if it should be determined later to move the Brooklyn plant to Buffalo extensions can be made in such a manner as to provide the most economical arrangement. It is planned to use Niagara power for the operation of the plant; but the power house will be arranged to admit the installation of equipment for the generation of electric power by the company, if desired. It is expected that the buildings will be completed by the end of this year and that the new machinery required will be purchased early in 1914 and not before. The machinery equipment will consist of hammers, presses, shears, drill presses and small machine tools of various kinds. The plant will be located in the Black Rock district on a 90-acre site at Kenmore avenue and O'Neil street to which ample railroad connections are provided by a spur from the Niagara Falls line of the New York Central Railroad, which is also used by the Lackawanna and Lehigh Valley Railroads.

Important evidence has recently been taken in London on commission in connection with litigation which will probably take place shortly in this country. It is being taken in behalf of an American company which some years ago registered a patent in the United States for the manufacture of steel containing vanadium, and which also holds patents for vanadium steel in the United Kingdom and Germany dating from 1907. The witnesses in London included a number of Sheffield manufacturers and merchants, as well as some metallurgists, among them Professor Arnold. The defendant will be a steel manufacturing firm of Pittsburgh, and if the suit is successful the stopping of the manufacture of vanadium steel, except under license, in the United Kingdom and Germany will be attempted.

The Aldrich Pump Department of the Allentown Rolling Mills, Allentown, Pa., manufacturer of the Aldrich triplex and quintuplex electric and power driven pumps, has opened a branch office at 636 McCormick Building, Chicago, in charge of W. N. Flickinger, who for the past six years has been its general Eastern representative. A strong increase in Western business and the desire to facilitate transactions prompted the opening of this office.

It is reported that the New York Central Iron Works, Hagerstown, Md., which has been in financial difficulties for some time, has been adjudged a voluntary bankrupt. Daily prints place the assets at $126,671 and liabilities at $215,368. Pending the selection of trustees, the papers name J. C. Lane, Charles D. Wagaman, M. P. Moller and D A. Stickwell as receivers.

Scrap Prices at Chicago, 1903 to 1913

The subjoined tables give the monthly prices of five leading classes of old material at Chicago from January, 1903, to June, 1913, inclusive, averaged from weekly quotations in *The Iron Age*.

Heavy Melting Steel Scrap, per Gross Ton

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913
January	$18.05	$10.13	$14.88	$14.95	$16.80	$11.05	$13.94	$16.00	$11.75	$10.75	$12.60
February	18.13	10.88	14.13	13.63	15.75	12.50	13.56	15.50	12.06	10.75	12.13
March	18.31	11.50	14.45	13.00	16.00	11.44	12.13	15.00	12.15	10.94	12.08
April	18.35	11.25	14.38	13.50	15.75	11.05	12.35	14.44	11.75	11.56	12.50
May	17.63	9.75	12.55	13.70	15.60	10.62	13.44	13.56	10.50	12.05	11.25
June	16.50	9.30	11.95	13.13	16.25	11.62	14.50	13.15	10.38	12.12	10.44
July	16.30	9.00	12.75	13.13	16.12	11.75	14.06	12.38	10.69	11.69	.....
August	16.00	9.25	13.15	14.10	15.10	12.88	15.00	12.25	11.05	12.25	.....
September	13.75	10.00	14.38	16.50	14.75	13.00	16.00	12.25	10.70	12.81	.....
October	12.80	10.88	14.50	16.60	14.70	13.45	16.43	12.25	10.00	13.95	.....
November	11.25	12.55	15.20	17.50	12.63	14.88	16.00	12.25	9.75	13.69	.....
December	9.00	14.15	15.25	17.13	11.50	15.17	16.00	12.10	10.25	12.88	.....

Old Steel Rerolling Rails, per Gross Ton

January	$23.50	$11.75	$16.00	$16.50	$19.00	$12.30	$15.81	$18.00	$13.69	$13.00	$16.50
February	23.50	13.13	15.13	16.25	19.00	13.00	15.12	18.00	13.63	12.80	15.50
March	22.13	13.00	15.30	15.70	19.00	12.19	13.06	17.80	13.65	12.75	15.00
April	22.00	13.00	15.44	15.75	18.50	12.60	13.20	17.69	13.44	12.88	14.63
May	22.13	11.88	14.06	16.00	18.60	12.94	14.44	17.12	13.49	13.50	13.95
June	21.00	10.80	12.95	15.88	18.94	13.94	15.50	16.50	12.38	13.50	12.69
July	19.00	10.31	13.56	15.50	18.00	14.50	15.40	15.88	12.25	13.50	.....
August	19.00	11.50	14.35	15.90	17.00	15.63	16.12	15.31	12.65	14.00	.....
September	17.33	11.81	15.25	17.63	16.75	16.18	17.15	15.25	12.75	15.00	.....
October	15.40	12.38	15.63	18.63	17.15	15.80	18.00	15.25	12.44	16.30	.....
November	13.50	14.75	16.30	21.15	15.06	17.19	18.00	15.06	12.30	16.50	.....
December	10.60	16.00	16.50	21.00	12.94	16.95	18.00	14.20	12.50	16.50	.....

Old Iron Rails, per Gross Ton

January	$24.00	$14.00	$21.13	$23.00	$27.40	$15.60	$18.81	$20.00	$15.00	$15.19	$17.05
February	24.00	16.50	20.00	21.75	25.50	17.12	18.25	19.25	15.25	15.25	16.25
March	24.00	16.60	19.60	20.75	25.00	15.44	16.94	19.00	15.35	15.31	16.25
April	23.75	16.88	19.75	20.88	24.88	15.00	16.10	18.50	14.69	15.56	16.19
May	23.75	15.88	18.50	21.25	24.50	14.81	16.63	17.62	14.69	16.25	15.90
June	21.00	14.65	17.15	21.25	24.50	15.50	17.00	17.00	14.38	16.25	14.75
July	19.70	14.13	17.81	21.25	23.75	15.90	17.00	16.75	14.25	16.25	.....
August	18.50	15.32	19.35	21.90	20.65	16.56	18.38	16.25	14.25	16.30	.....
September	17.75	16.00	20.88	23.50	20.25	17.35	19.20	16.00	14.50	16.88	.....
October	17.00	16.69	22.13	26.00	20.05	18.00	20.75	16.00	13.88	17.95	.....
November	16.25	20.13	22.90	28.00	17.63	18.38	20.62	16.00	14.75	18.25	.....
December	13.00	22.00	23.00	28.00	15.50	19.50	20.00	15.70	15.00	17.68	.....

No. 1 Railroad Wrought, per Net Ton

January	$19.50	$10.85	$18.19	$17.30	$16.35	$11.20	$13.81	$14.88	$11.75	$11.63	$12.70
February	19.50	12.50	17.00	15.88	15.50	12.44	12.88	14.69	12.00	11.30	12.19
March	19.75	12.80	16.40	14.88	15.25	11.25	11.43	14.45	12.30	11.44	12.08
April	20.40	12.50	16.06	14.50	15.25	11.00	11.90	14.19	11.69	12.31	12.31
May	19.13	11.38	14.19	14.50	15.45	10.75	12.81	12.87	11.38	12.75	11.25
June	16.13	10.50	13.50	13.50	16.06	11.69	13.38	12.75	11.25	12.57	10.50
July	14.65	10.44	14.13	13.50	15.06	12.15	13.16	12.44	11.00	12.06	.....
August	14.19	11.13	15.45	14.50	14.40	12.69	14.44	11.94	11.10	12.50	.....
September	14.06	11.85	16.31	16.13	14.38	13.44	15.35	11.94	10.94	13.13	.....
October	13.55	12.50	17.00	17.50	14.60	13.60	15.94	11.75	10.44	14.25	.....
November	12.00	15.44	17.50	18.00	12.32	14.38	15.31	11.94	10.20	13.50	.....
December	10.00	17.55	18.00	17.25	11.00	14.83	14.75	11.65	10.75	13.06	.....

Heavy Cast Scrap, per Net Ton

January	$17.30	$10.50	$13.81	$14.70	$17.80	$12.95	$13.06	$14.88	$12.19	$11.25	$12.90
February	16.63	11.38	13.13	13.50	18.25	13.00	12.75	14.88	12.13	11.25	12.56
March	18.13	12.00	13.40	12.75	19.50	12.12	12.19	14.50	12.25	11.31	12.50
April	17.80	11.13	13.81	12.94	18.88	12.05	12.60	13.69	11.81	12.06	12.44
May	16.75	10.25	12.50	13.40	18.55	11.50	13.31	13.13	11.00	12.20	11.60
June	14.63	8.80	12.40	13.50	18.94	12.00	13.81	13.00	10.75	11.81	10.63
July	14.20	8.94	13.38	13.50	18.44	12.15	13.44	13.00	10.50	11.75	.....
August	14.00	9.88	13.20	14.00	16.75	12.75	14.06	12.75	10.55	12.15	.....
September	13.00	10.70	13.38	15.38	16.81	12.88	14.75	12.75	10.10	12.81	.....
October	12.40	10.05	13.63	15.90	16.25	13.25	15.63	12.50	10.25	14.20	.....
November	11.63	12.69	14.30	17.50	14.00	13.75	15.12	12.50	10.35	13.50	.....
December	10.50	14.15	15.00	17.50	13.00	13.92	14.75	12.30	11.00	13.25	.....

Billet Prices for Twenty-seven Years

The subjoined table gives the average monthly prices of Bessemer steel billets at Pittsburgh from 1886 to 1912 inclusive. The prices are per gross ton and are averaged from weekly quotations in *The Iron Age*. Prior to 1886 steel billets were not a regular merchant commodity, seldom being mentioned in market reports.

	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
January	33.00	34.50	29.38	28.15	36.65	25.60	25.00	21.56	16.12	14.90	16.80	15.42	14.93	16.62
February	33.13	35.44	29.38	27.81	35.25	26.00	24.36	21.62	15.75	14.95	17.38	15.25	15.06	18.00
March	33.00	36.00	29.13	27.25	31.88	26.25	23.00	22.60	15.55	14.84	17.09	15.44	15.25	24.30
April	32.00	34.75	28.63	27.00	28.38	25.35	22.81	22.44	15.69	15.44	19.53	14.60	15.06	25.37
May	30.50	32.38	28.35	26.90	27.55	25.50	22.41	21.69	18.00	16.30	19.50	13.82	14.85	26.75
June	30.75	31.40	28.06	26.75	30.25	25.25	22.97	21.70	18.12	18.63	19.12	14.06	14.65	30.10
July	30.33	31.50	28.00	27.13	30.70	25.50	23.50	21.06	18.00	20.75	18.85	14.00	14.50	33.12
August	30.00	32.50	28.40	28.20	30.38	25.31	23.81	20.45	17.15	21.75	18.75	14.00	15.85	35.40
September	30.50	31.80	29.00	29.50	30.13	25.00	23.65	19.31	17.19	24.00	19.75	15.60	16.00	38.37
October	31.63	31.63	29.25	33.70	28.70	24.90	23.53	18.06	16.00	21.90	19.75	16.44	15.56	38.75
November	32.00	31.00	29.00	34.00	27.39	24.16	24.94	17.37	15.57	19.13	20.00	15.57	15.06	36.50
December	32.90	29.00	28.44	35.60	26.25	24.20	22.40	16.69	15.12	16.97	17.50	15.00	15.80	33.75

	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.
January	34.50	19.75	27.50	29.60	23.00	22.75	26.25	29.40	28.00	25.00	27.50	23.00	20.00
February	34.87	20.31	29.37	29.87	23.00	23.50	26.50	29.50	28.00	25.00	27.50	23.00	20.00
March	33.00	22.88	31.25	30.62	23.00	24.00	26.70	29.00	28.00	23.00	27.50	23.00	19.75
April	32.00	24.00	31.50	30.25	23.00	24.00	27.00	30.12	28.00	23.00	26.75	23.00	20.00
May	28.90	24.00	32.20	30.37	23.00	23.50	26.40	30.30	28.00	23.00	26.12	22.60	20.80
June	27.25	24.38	32.37	28.87	23.00	22.00	26.63	29.62	25.75	23.00	25.30	21.00	20.87
July	21.00	24.00	31.75	27.60	23.00	22.00	27.25	30.00	25.00	23.50	25.00	21.00	21.50
August	18.20	24.20	31.06	27.00	23.00	24.00	27.80	29.25	25.00	24.13	24.62	21.00	22.12
September	16.93	24.88	29.50	27.00	20.00	25.00	28.00	29.37	25.00	25.00	24.40	20.75	23.62
October	16.50	26.70	29.70	27.00	19.50	25.62	28.00	28.20	25.00	26.25	23.75	20.00	26.00
November	18.95	27.00	28.50	24.00	20.25	26.00	28.88	28.00	25.00	27.13	23.30	19.50	27.00
December	19.75	27.50	29.12	23.00	21.20	26.00	29.50	28.00	25.00	27.50	23.00	19.25	27.00

A Compensating Quadrant Crane

The Derrick Type of Hoisting Apparatus Designed for Light and Heavy Work

BY HARRY W. BROADY*

Since the publication in *The Iron Age* of November 28, 1912, of a brief description of a hoisting apparatus known as the compensating quadrant crane, the building of several cranes of the new design and many tests enable a more complete presentation of its features and construction than was heretofore possible. The crane, which is intended for a wide variety of applications and for heavy as well as light work, is the invention of Capt. A. P. Lundin, president Welin Marine Equipment Company, Long Island City, N. Y., and Axel Welin, Welin Davit & Engineering Company, London, England.

The new crane is of the derrick type. In the larger sizes the jib is fastened at its lower end to two quadrants. In smaller cranes the jib and the quadrant are cast in one piece. The circumferential part of the quadrant has both a finished surface rolling in a slot and teeth engaging in a rack. The slot and the rack are cast in the bottom plate. A framework is built up on the bottom plate, consisting of a frame forward and one aft, with a connecting top piece. The actuating screw works in bearings in this top part, which also holds the bearing at the top of the post. The bearing at the bottom of the post is a part of the bottom plate. This actuating screw swings the quadrant by a nut which slides on a guide on the top part of the frame. The bottom plate has four rollers for slewing, that roll on a beveled flange on the post plate. Four features which are distinctive in the compensating quadrant crane are: 1. The rolling quadrant arrangement giving the jib a movable pivoted point. 2. The actuating screw arrangement with the application and direction of the derricking forces on the jib. 3. The horizontal travel of the load. 4. The compensation tending to reduce bending in the jib in proportion to the load.

There are two different compensating devices. The first, which is shown in Fig. 1, is obtained by the use of two parallel links pivoted in one end near the top of the jib, and in the other end holding two sheaves over which the hoisting ropes run. This end of the links is held by a chain that runs over the sheave at the top of the jib and is connected by a rod with a three-arm dog pivoted at the top of the back frame. The other two arms of the dog are connected with the lower back end of the quadrants by chains running over sheaves on the bottom plate. In the second device for compensation, which is illustrated in Fig. 2, the fixed end of the hoisting rope is fastened to the jib at a point near the top, and runs back and forth over sheaves on the back part of the frame and on the top of the jib.

The hoisting machinery is of the kind usual in cranes. The slewing is secured by a system of gears under the bottom plate, which engages an annular rack in the post plate. The derricking is accomplished by the actuating screw, which has a worm or spur gear drive. The necessary counterbalancing is cared for by a well-secured weight. The driving power can be of any desired kind.

The crane shown in Fig. 1 is a 2½-4-ton, three-motor crane, one motor for hoisting, one for slewing and one for derricking. Levers, controllers and all other necessary parts for operating the crane are worked from the platform.

By rolling the jib on narrow circular flanges of a large radius and controlling the position of the supporting point by a rack, no large bearing surfaces are needed. The friction in the rack is almost negligible, as it is spur gear friction. The quadrant being part of a circle that has its center in the center line of the actuating screw, and this center line being parallel to the tangent of the quadrant at its supporting point, the force applied in the screw is always at right angles to the line between the moving fulcrum and the point of support of the quadrant and this means maximum leverage. The required power for derricking is therefore minimized and decreases rapidly the higher the jib is raised. It also follows from this that there is no bending of the screw, only tension. The arrangement does not cause any pressure to be communicated along the jib to the point of support and a low, compact design can be used, allowing a clear swing of 360 deg.

The compensating features give the load a horizontal travel. At the beginning, the path of travel rises from 1 to 3 in. It is intended not to compensate for this small rise, as it eliminates the necessity of hoisting the load to clear, before derricking, thus utilizing a small amount of power and reducing the time for loading and unloading. With a multiple-speed crane of this type different sizes of loads can readily be taken without changing the gearing. To have the load travel in a horizontal line it is only necessary to apply practically sufficient power to bring the load up to the required derricking speed, after which the lateral movement requires little additional power. The energy required for derricking is used in raising the resultant center of gravity of the moving parts, to give an accelerated horizontal motion at the start and to overcome friction.

The compensating devices have another influence on the working of the crane. By the arrangement of the two links in the first-mentioned device, the bending and the pressure on the jib are reduced while at the same time the links help in making the load travel in a horizontal line. They also tend to steady the sheaves over which the hoisting ropes run. By means of the chains, the rod and the dog which connect the links with the quadrants, a force is produced that tends to reduce tension in the actuating screw. The direction of the pressure transmitted through the dog on the top part of the after

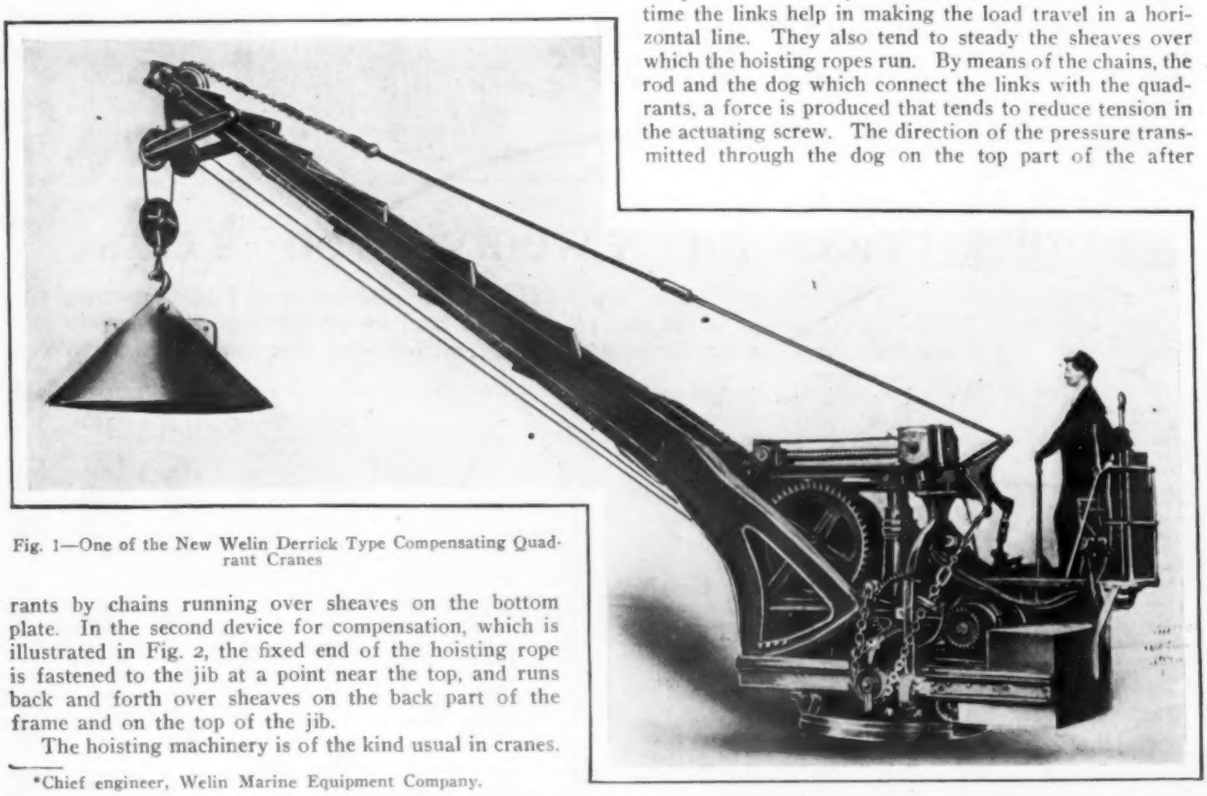


Fig. 1—One of the New Welin Derrick Type Compensating Quadrant Cranes

*Chief engineer, Welin Marine Equipment Company.

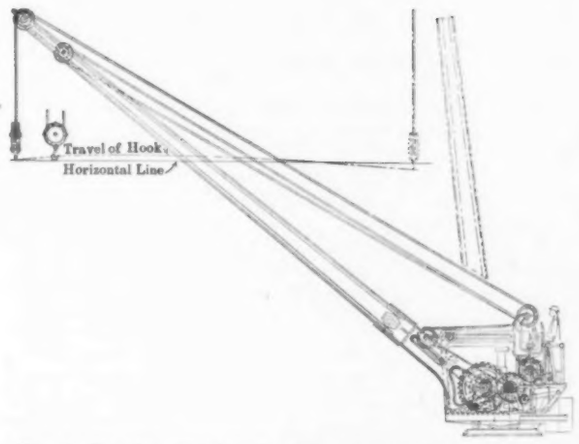


Fig. 2—Drawing Showing the Other Compensating Arrangement

frame is such that a lighter construction of the framework is possible than if a stay were connected to the frame.

With the second compensating device a practically horizontal travel of the load is obtained when derricking and at the same time a considerable force is produced that reduces the bending force on the jib and the tension in the actuating screw. In both cases the compensating action of the forces is more and more effective as the load increases, which accounts for the relatively small increase in the derricking power needed for a large increase of the load. An example of this fact is that on the crane shown in Fig. 1. the increase in power necessary for derricking was only about 30 per cent. from no load to full load.

The action of the compensating devices is such that the weight of the crane and also the necessary counterweight is reduced while the construction is simplified and the number of parts are reduced.

In the case of a 20-ton crane tests have shown that the jib in a horizontal position will stand a load of about 10,000 lb., making possible the handling of smaller loads at a considerably greater radius than is usual. The jib of this crane can be raised easily to its working position, thus making this type of compensating quadrant crane especially adaptable for locomotive cranes, wrecking cranes, battleship cranes, etc. When an unusually heavy load is handled and slewing is necessary, the easy derricking of the jib makes it convenient to bring the load in near the center of the crane and then slew it, after which the jib is let out again to place the load in the desired position.

Some of the large cranes are designed with a counterweight arrangement which is of especial advantage for the reason that the effect of the counterweight is automatically regulated to suit the different positions of the load. At the same time the pull exerted on the jib will tend to reduce the tension in the actuating screw materially, thus still further reducing the power needed for derricking. In a few words, the counterweight acts also as a compensating device on the jib.

There are various adaptations of the crane. In some a single motor is provided, while others of small capacity are mounted on electrically propelled trucks.

The Southern Steel & Iron Works, Jacksonville, Fla., whose factory was burned June 16, expects to rebuild. The burned building, which was 110 x 250 ft., will be replaced by a concrete and steel structure throughout, two stories. It is intended to install in connection therewith a steel plant for the manufacture of steel castings, a foundry for gray iron castings and a thoroughly equipped machine shop, pattern making department, etc. A 500 hp. oil engine, with an electric generator, will furnish the power, all the machinery to be operated by independent motors. Plans are now being prepared by the H. G. Perring Engineering Company, Jacksonville.

Very few cities in China have a telephone exchange with as many as 500 subscribers and the average exchange has less than 200.

Automatic Helical Spring Machines

One Produces Continuous Coils Which the Other Cuts Up and Forms the End Hooks

The Sleeper & Hartley Company, Worcester, Mass., has brought out an interesting pair of automatic machines. One of these is a plain spring coiling machine which takes wire from the coil and produces either open or closed extension springs having a length of 150 ft. or more and the other is a helical cutting and hooking machine which produces the helical springs that are used in the manufacture of spring beds, in such quantities as to make it a tonnage proposition. The machines are designed to operate together and are so timed that the product of one equals that of the other. Fig. 1 is a view of the plain spring coiling machine, while details of its construction are given in Fig. 2. Fig. 3 is a front and a rear view of the helical cutting and hooking machine, the mechanical details of which are reproduced in Fig. 4.

The plain spring coiling machine, which is illustrated in Fig. 1, possesses sufficient power to force great lengths of coil through. The range of wire is up to No. 9 gauge and the output is 4000 lb. of springs per day with due allowance for idle time. The weight of this machine is 800 lb. and the floor space occupied measures 24 x 40 in.

Referring to Fig. 2, which gives the mechanical details of the machine, the wire passes through the two pairs of feed rolls *a* and across the face of the adjustable guide or wire support *b*, which keeps it from buckling. It then passes under the spring coiling arbor *c* and strikes the grooved periphery of the coil forming rolls *d*, which deflects it to guide the coil around the arbor, from which, as the operation proceeds, the spring is driven off by the succcessive coils formed behind it. The diameter of the coil depends upon the relations existing between the centers of the spring arbor and the coil forming roll, the latter being adjustable by the screw *e*, which is operated by the handwheel *f*.

The helical cutting and hooking machine, front and rear views of which are given in Fig. 3, can handle No. 12 and No. 11 gauge wire in spring lengths from 12 coils upward and produces 100 springs per min. or from 3000 to 4000 lb. per 10-hr. day including stoppages. The crated weight of this machine is 1700 lb. and the floor space required measures 46 x 53 in.

The long coil is fed automatically through the machine to a point where each spring is measured by a positively-

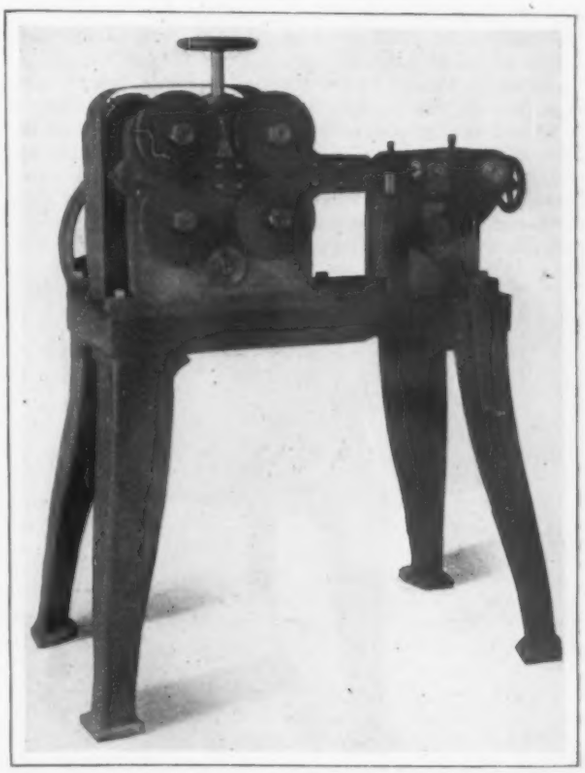


Fig. 1—The New Sleeper & Hartley Plain Spring Machine

acting device and cut off according to the number of coils desired. From here the spring is carried between the dies which form the hooks and is ejected automatically. Slight variations in the diameter of the wire do not affect the

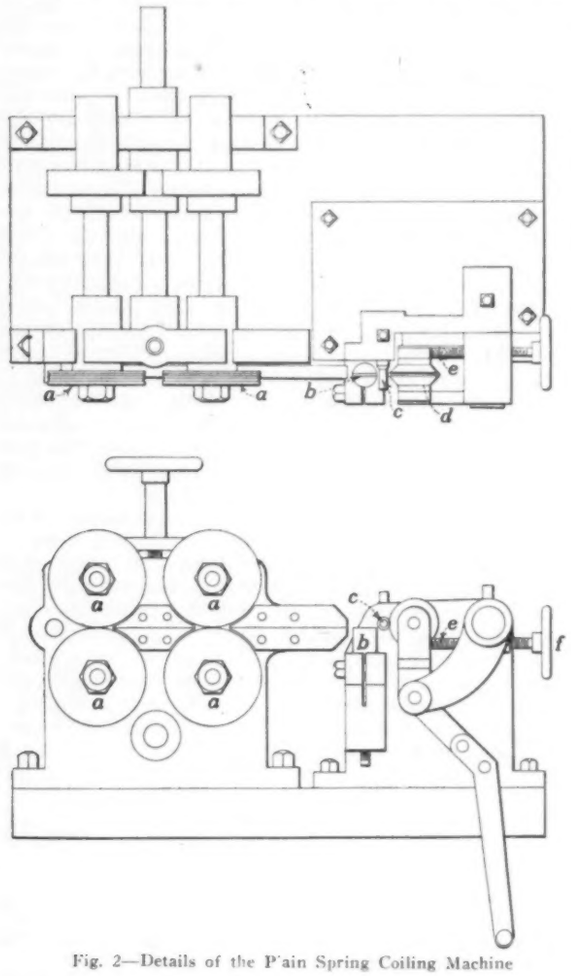


Fig. 2—Details of the Plain Spring Coiling Machine

forming of the hooks, a compensating mechanism measuring the spring and locking the dies in position. This arrangement insures correctness, even though the variation in length be as great as ¼ in. The opening of the hook can be varied as well.

Power is applied to the shaft at *g*, Fig. 4, which operates through gears, other shafts and cams to produce a completed spring with each revolution. The coil from the plain spring machine is entered at the tube *h*, until the end is gripped between the feeding rolls *i* and *j*, which carry it along intermittently counting off so many rings at each motion as may be required to give the desired spring length instead of measuring the length in inches. As the coil moves forward it passes through the spring jaws *k*, located on a carrier wheel, and at the same time an internal cutting arbor, *l*, is forced inside the coil. A thin blade coming from below and bearing against this arbor severs the wire, leaving the section of the spring in the jaws. The cutters are then withdrawn and the wheel moves through an angle of 60 deg., bringing the empty jaws in front of the feeding rolls.

The wheel, with a spring in each jaw, moves forward until a coil comes to rest between the hooking dies, *m* and *n*, which are then shoved forward until opposite the ends of the springs. At this time a wedge is forced in by spring pressure, driving a slide toward the carrier wheel, which presses one hooking die against one end of the spring and forces the spring against the other die, thus measuring the

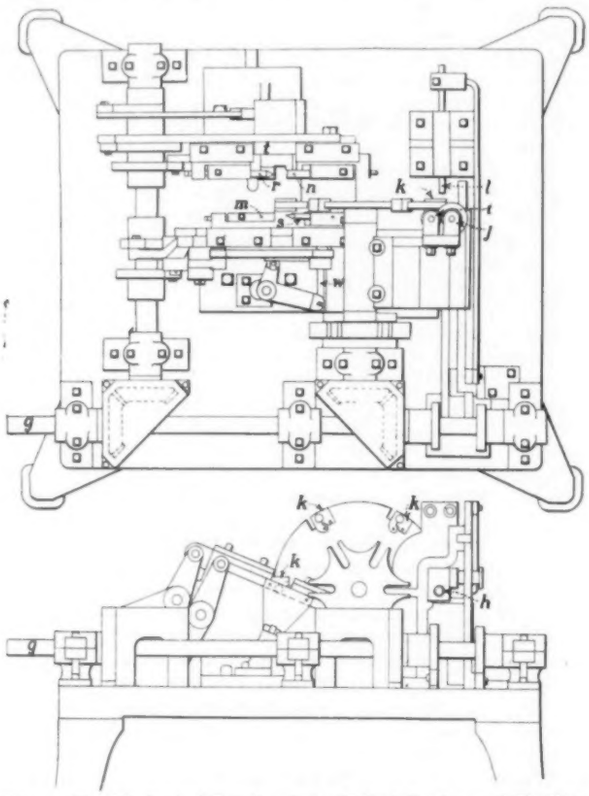


Fig. 4—The Mechanical Details of the Helical Cutting and Hooking Machine

exact length and locking the dies in position. The slide in its motion has also carried the hooking punch *r* until it is in the exact position between the coils, as it is held by the die *u*. The punches *r* and *s* are now forced forward, entering between the first coils of the spring, spreading them over and finally turning each down at right angles to form the complete hook. The tools then withdraw ready for the next spring, while the finished product passes along and is

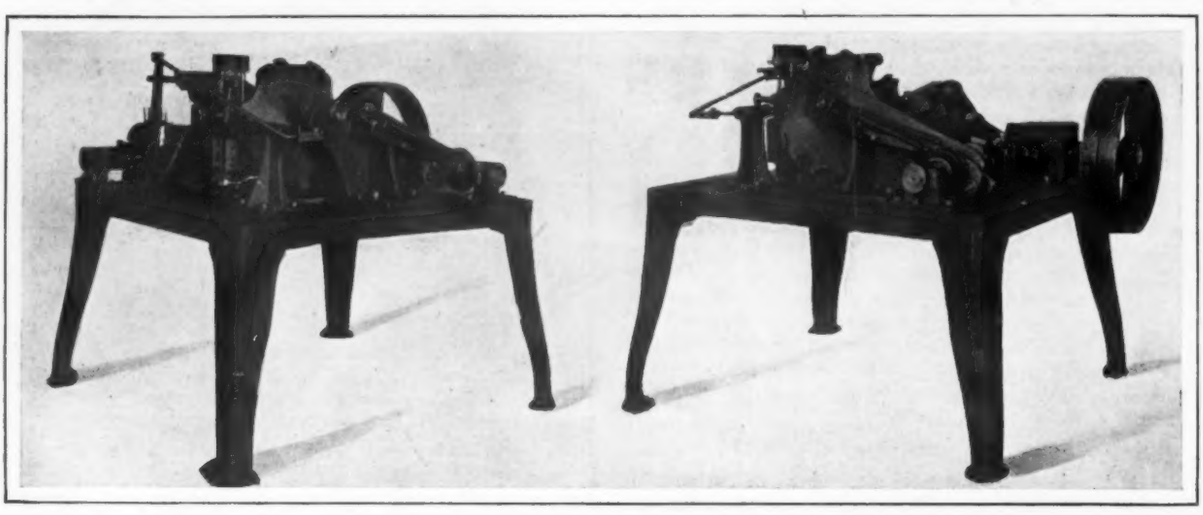


Fig. 3—Front and Rear Views of a Helical Cutting and Hooking Machine

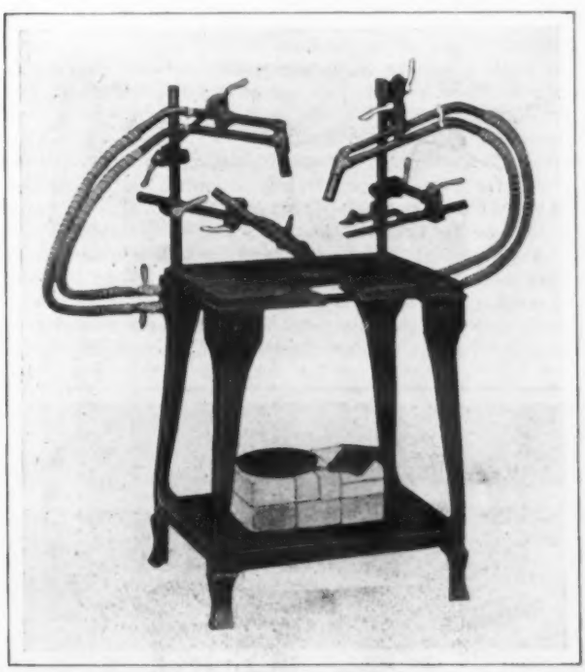
ejected by the plunger *w*. The die *n* and the punches *r* and *s* are pivoted at the rear to provide the swinging motion required in making adjustments and in performing the hooking operation.

A Brazing Table With Universal Adjustments

Ability to adjust the burners and the work holding clamps in all directions, together with the use of a motor-driven blower for furnishing the air blast, are the two special features claimed by the Improved Appliance Company, 455 Kent avenue, Brooklyn, N. Y., for its universal brazing table. The table has a cast-iron top 18 x 24 in. with a removable circular piece 7½ in. in diameter and a front section 3½ in. wide, which can also be taken out, as shown in the accompanying engraving.

The two burners are of a special type of wrought iron construction with brass orifices and have wired hose for receiving the air and gas supplies. The two bracket clamps can be used to hold the work in a convenient position for brazing or heating or can also be used to hold the parts which are to be brazed together, an arrangement which, it is pointed out, often makes it unnecessary to rivet the pieces before the brazing operation is performed. All of the burners and bracket clamps can be readily adjusted to practically any desired position, the clamps holding them having a universal adjustment on the bar which connects them to the uprights at the back. The connection between these bars and the uprights also possesses universal adjustments.

These tables can be used for annealing brass, sweating solder, heating rivets, etc., the necessary arrangement of firebrick being easily made on the table. If desired, the table can be used for forging, tool dressing, straightening bent axles, etc., by building a shop forge of firebrick, or an oven furnace can be similarly made for hardening, tempering, etc. Bearing metals can be melted off the bearings and permitted to run on the top of the table, and babbitt and solder pots may be quickly heated to any desired temperature.



A Brazing Table Having Universal Adjustments of the Clamps for Holding the Work and the Burners

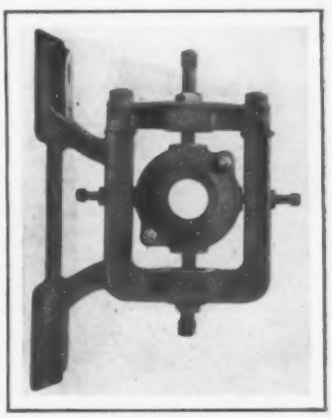
In operating this table, an air pressure of ½ lb. or higher is required, the supply being taken either from a shop compressed air line or supplied by a positive blower which can be furnished.

A campaign to induce shippers to furnish railroad companies with legible shipping orders is being conducted by the Chicago Association of Commerce. Careless writing has resulted in many losses and delays.

A New Type of Ball Bearing Shafting Hanger

A new type of ball bearing line-shaft hanger has been brought out by the S. K. F. Ball Bearing Company, 50 Church street, New York City. Among the advantages claimed for this hanger are a simple yet strong design, the ability to run at high speeds and a reduction in the amount of lubrication required. This hanger is made in two types, one for ceiling and the other for post or side-wall use, the latter being the one illustrated.

In both types of hanger the box containing the self-aligning ball bearing is suspended in the hanger frame on four adjusting screws, which makes vertical and lateral adjustments possible. The boxes are made in a single piece which is accurately machine finished for the reception of the ball bearings and has a face cap. The assembled box forms a large lubricant chamber with grooves adjacent to the shaft for the retention of the lubricant. This arrangement, it is emphasized, reduces the amount of lubrication required and at the same time does away with leakage with a corresponding saving in the cost of maintenance.



A New Post Hanger for Line Shafting Equipped with Self-Aligning Bearings

The ball bearings themselves provide the alignment feature within the hanger box. The other race is ground in the form of a sphere, whose center is at the center of the rotation of the bearing, and the inner race and double set of balls act within this spherical race in a manner somewhat similar to a ball and socket joint. In case the shaft springs under a load, the bearings adjust themselves automatically to the deflection and at the same time maintain a uniform circle of rotation for the balls. This freedom in aligning action is arrived at by grinding the outer ball race in the form of a section of a hollow sphere. The bearings are gripped on the shaft by a tapered sleeve, called an adapter, between the inner ball race and the shaft. The split sleeve is drawn up and held securely in position by a lock nut and set screw.

Speeds as high as 600 to 1000 r.p.m. without danger of heating can be secured with shaft running in these hangers and there is also a considerable reduction of pulley and shaft sizes and weights, as well as in belt sizes and costs as a result of this increase in speed.

Colorado Fuel & Iron Company Finances

In accordance with the plan for the readjustment of its finances, the $15,000,000 Colorado Fuel & Iron Company's debentures which matured August 1, 1911, and which have been held by the New York Trust Company as security for the Colorado Industrial Company bonds, have been cancelled and destroyed. The Colorado Fuel & Iron Company has deeded its real estate to the Industrial Company and a supplemental mortgage has been executed by the Industrial Company to the New York Trust Company as further security for the Industrial Company bonds. All the property of the Industrial Company has been conveyed back to the Colorado Fuel & Iron Company, so that all the property ever held by the Colorado Fuel & Iron Company is reassembled in the Colorado Fuel & Iron Company, subject to the Central Trust Company mortgage, under which $5,500,000 first mortgage bonds are outstanding and the $45,000,000 Colorado Industrial Company bonds. These $45,000,000 of bonds include the amount necessary to take care of the $5,500,000 bonds when they mature.

The Ball Brothers Glass Mfg. Company, having factories at various points in Indiana and Kansas, will soon erect at its central plant at Muncie, Ind., a new administration or office building. Its exact size has not yet been determined.

Handling Cost Reduced by Tractors

Material Going through Plant Kept on Wheels—Sheets Handled with Magnets

One of the largest items of expense in the operation of the manufacturing plant is the cost of moving material through the shop while it is in the process of manufacture, and during the past few years manufacturers have devoted much attention to this subject with a view of effecting greater economies. While the question is to a certain extent a general one manufacturers of different lines of products have different conditions to meet, and in fact each individual plant has its own handling problems to solve.

The subject is one which has been given much study by James H. Foster, vice-president and general manager, Hydraulic Pressed Steel Company, Cleveland, Ohio, who aimed to devise a system that would be as universal and as flexible as possible. After consideration of various

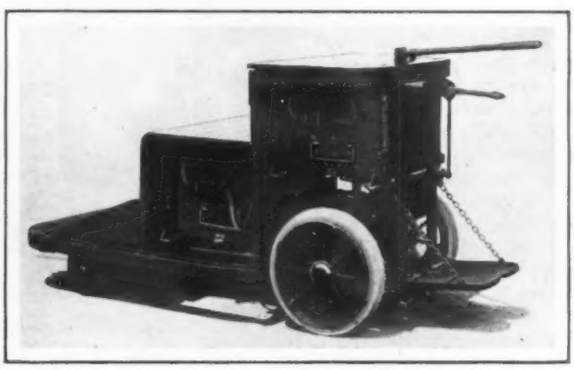


Fig. 1—Elwell-Parker Electric Tractor Designed for Hauling Trucks or Trailers

methods his attention centered on the trucking system. The ordinary hand-drawn platform trucks have always had the advantage of flexibility, but the hand labor for moving them is expensive and inefficient. Storage battery trucks each having its own motive power are being used extensively for handling baggage in the large railroad terminals, but it is not practical to employ these power trucks where they serve for storage purposes the greater part of the time. Following an idea suggested by these baggage trucks the company decided to put in use a storage battery tractor, somewhat similar to the baggage trucks, but designed to pull other trucks or trailers on which material is loaded and where it remains until needed.

Elwell-Parker Storage Battery Trucks

The tractor adopted, which is shown in Fig. 1, was designed and placed on the market by the Elwell-Parker Electric Company, Cleveland, Ohio. It has a cold pressed steel frame, on which is mounted a storage battery. The driver stands on a platform at the front where the control levers are within easy reach. The truck is mounted on two large driving wheels and two small rear wheels, all being rubber tired. The tractor is 7 ft. long, 3½ ft. wide over the body at the front and 3 ft. wide at the rear end. Its hight is 45 in. Crucible steel drop forgings and alloy steel are used in its various parts. Every part is machined to gauge or drilled to jig so that all parts are interchangeable.

The motor, which is made by the Elwell-Parker Electric Company, is series wound, and water and dust proof. The controller is of a drum type in three speeds, both forward and reverse. An automatic switch is combined with the controller and the operator's platform to open the main circuit automatically and return the controller to the "off" position when the operator steps from the platform and twin brakes inclosed in the countershaft housing combined with the operator's platform automatically stop the tractor when the operator leaves the platform. A four-wheel steering device provides the shortest possible turning radius, that of driving wheels being only 7 ft. The tractor is equipped with an all gear drive with the first reduction from the motor to the countershaft and the second reduction from the countershaft through universal pinions to the driving wheels.

The tractor can be used for hauling any type of trailer provided it is designed so that a coupling can be made to the tractor. Its rated capacity is 5 tons but during tests made on good floor it has hauled a trailer with a 10-ton load. Its speed is 7 to 8 miles per hour empty, and 5 to 6 miles per hour loaded. Its weight with a lead battery is 2050 lb. and 1900 lb. with an Edison battery.

Construction of the Trailers

Trailers or trucks of a special design having a capacity of 5 tons are used in the plant of the Hydraulic Pressed Steel Company, as shown in Fig. 2. These are all steel 3 x 7 ft. in size with removable stakes, and run on a pair of wheels with a 48-in. gauge which are placed at the center. The wheels are 18 in. in diameter and have a 3-in. face. The trailers are low hung, the platforms being only 10 in. from the floor, thus making the center of gravity low, and eliminating the danger of the trailer overturning in making a quick sharp turn. At each end under the platform is a pair of 7-in. wheels of a caster type which support the ends of the trailer when not evenly balanced on the center wheels. The chassis of the trailers is standard so that a tractor can be coupled to any trailer. At present 450 trailers are used in the plant and these are moved with two tractors. The company intends eventually to increase the number of trailers to 1000. It is planned to keep to a standard for the running gear of these trailers, but to vary the superstructure to meet the needs of the various articles

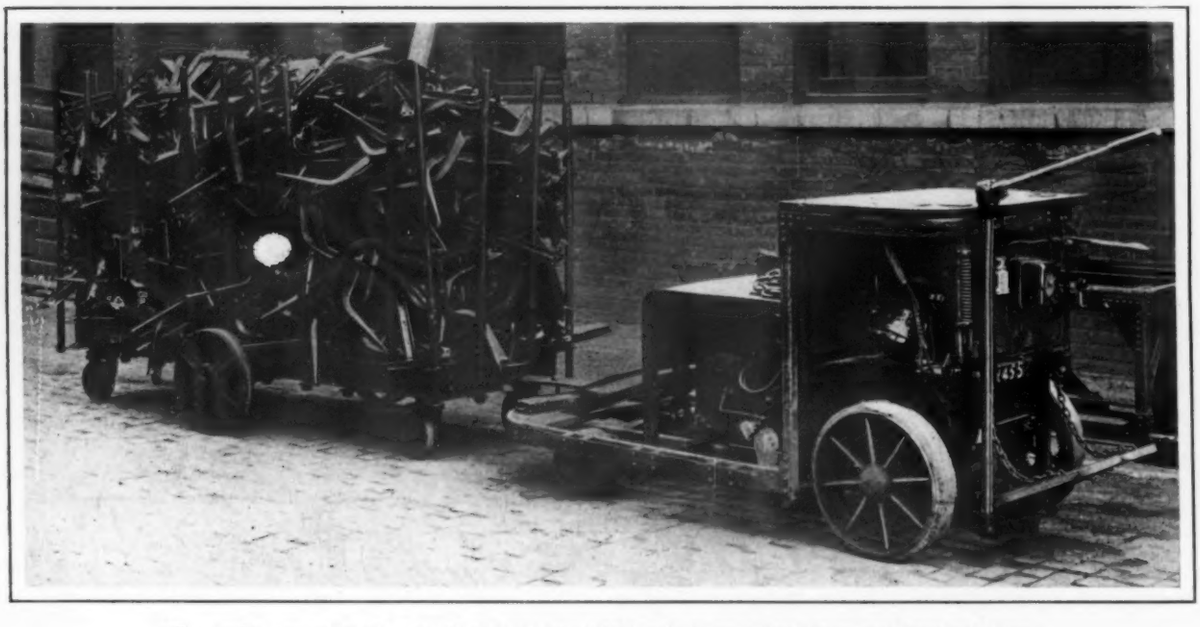


Fig. 2—Tractor and Trailer As Used In Plant of Hydraulic Pressed Steel Company, Cleveland, Ohio

to be carried. It may be necessary, however, to have a few special trailers, but these will be kept as close to standard as possible.

Passageways and Proposed Central Station

In the operation of the handling system the shops and yards have been laid out into streets and avenues, inclosing squares of about 20 x 20 ft., these dimensions varying in some cases to conform with shop arrangements and the location of columns and machinery. Passageways are kept clear so that traffic is not interfered with. Details for operating the system with the best possible results have not yet been completely worked out, but these will include the establishment of a central station in charge of an operator who will issue the necessary directions to the engine men for moving the cars. The latter are familiar with the location of all the squares so that if an engine man receives instructions to take the trailer loaded with certain material from square No. 10 to square No. 240 he requires no further explanation as to what is wanted. Stations will be established at various points in the shop from which the engine men will call in by telephone to the central operator.

One trailer is hauled at a time by a tractor which in addition to the engine man now requires the services of a second man to make the coupling. The company is now designing an automatic coupler which will make it possible to dispense with the services of a coupler man. The central station man will keep a double card index, giving a record of the cars and the materials which are loaded on them.

Saving of Labor Demonstrated

The Hydraulic Pressed Steel Company manufactures heavy stampings and pressings made from steel sheets and plates. A considerable percentage of its output goes to the automobile trade in frames, brake drums and step hangers. The stock and parts handled range in weight from a few pounds up to 500 lb. Realizing that it costs money to set material down and to pick it up the handling system was devised to eliminate this cost as much as possible and it has already enabled the company to dispense with the services of 40 laborers. When the system is completely working in all its details and the required additional trailers are placed in use the company plans to have no material touch the floor from the time the raw material, consisting of light plates and heavy sheets, is taken into the plant until the finished product leaves the shop. In the process of manufacture the steel sheet or partly finished part will be taken from one truck at the side of a press or other machine and after the operation on that machine is finished instead of being thrown on a pile on the floor it will be loaded on another truck on the other side, ready to be carted to another machine for the next operation.

This system can, in many cases, entirely eliminate the shop stockroom for material in the process of manufacture and piles of stock around the shop floor. All of the material is on wheels when it is not going through the machines. The Hydraulic Pressed Steel Company handles about 18,000 tons of steel a year and this undergoes an average of about ten operations before it is ready for shipment. Counting the setting down of the material and picking it up again from the floor in the old way meant the handling of 360,000 tons during the year. Much of the manual labor required by handling has been done away with by the use of the tractors. The company has not yet attempted to keep an accurate record of the cost of maintaining the tractors and cars but that they result in a great saving is indicated by the fact that the work formerly done by 40 laborers is now done by the tractors and trailers operated by two engine men and two coupler men.

The plant of the company covers 180,000 sq. ft. of floor space, being adjoining one-story buildings with the exception of the machine shop, which is a four-story structure. In handling material to and from the upper floors of the machine shop the trailers are carried on an elevator. Some parts of the plant have creosoted wood block floors and other parts have concrete floors. The latter floor material is being gradually replaced by the wooden blocks which will be used in all the main passageways in which the trailers operate.

Handling Sheets with Lifting Magnets

The cost saving effected in handling material in the yard by this company is fully as great as that accomplished by the tractor shop system. It has not been generally considered practical to handle sheets with lifting magnets, but magnets are being used for this purpose with the most satisfactory results. Sheets are received in open cars from which they are unloaded by the Electric Controller & Mfg. Company's magnets in connection with a 10-ton Shaw crane. From 16 to 20 sheets are handled at a time with the magnets. As the sheets are not stacked up when they are lifted from the cars a simple device has been made for stacking them. This consists of a frame made of railroad rails with jaws extending up making a funnel-like arrangement. After the crane lifts its load of sheets from the car it drops them under this stacking device and as they slide down they become as evenly stacked as they could be by hand. Then the magnet again lifts up the pile of sheets and they are placed on the yard stacks. The stacking device is adjustable so that it can be changed to fit any size of sheets.

When the steel is taken from the stock piles in the yard of the shop it is carried by the magnets which deliver it on the trailer cars. They also carry scrap from these cars to the railroad freight cars. It is stated that with the use of the crane and the magnets 50 tons of sheets can be unloaded from a car in 45 min. and that one crane man and two helpers who operate the yard can now do the work that formerly required the employment of 60 laborers.

Two New Portable Electric Drilling Machines

Two types of portable electric drilling machines having a capacity of 1¼ in. in steel have been developed by the Standard Electric Tool Company, Cincinnati, Ohio. One of these is a universal tool that operates on both alternating and direct current circuits, while the other is adapted for direct current use only. These are in addition to those which have been illustrated in *The Iron Age*, July 25, 1912, and January 9, 1913. The special features of the new machines are the use of ball bearings throughout, the use of an oil proof motor and unit construction.

A New 1¼-In. Portable Electric Drilling Machine Equipped with Ball Bearings and Built on the Unit Principle

These machines are of an entirely new design and are very simply constructed, being made up of five units which can be taken apart for inspection without disturbing any of the electrical connections. The gears are of case hardened steel and are mounted on ball bearings. Lubrication is provided by using grease.

The motor used is of the series type and is quite powerful. Its construction is such as to enable it to withstand hard usage and at the same time maintain the highest electrical efficiency.

Mesaba Range Meeting of Mining Institute

The annual meeting of the Lake Superior Mining Institute will be held August 26 to 30 on the Mesaba range. A committee of Duluth members, including representatives of Mesaba range mining companies and railroads, is at work on the excursion programme, Duluth being the headquarters for the meeting. A report will probably be made by the committee on "Mining Methods on the Mesaba Range" appointed by the president of the institute in the past year. It consists of Willard Bayliss, Chisholm; E. D. McNeil, Virginia, and J. S. Lutes, Biwabik, Minn.

Germany's new increased taxes necessitated by army expenditures are arousing a great storm of protest all over the empire.

The Property of Toughness in Metals*

Various Methods of Measuring It—Ultimate Strength by Tension and Cold Bend Tests

BY ALBERT F. SHORE

A metal to be tough must have a high elastic strength and considerable ductility. A brittle metal of great strength is not tough, nor is a ductile metal of low strength. It is difficult sometimes to tell just when toughness begins; for example, the plasticity of such a metal as lead is a different property from the ductility of gold.

The property of toughness in metals does not appear to have been directly measured up to the present time. In that connection it is desirable that a scale for the measurement of toughness should be provided, such as we have for indicating temperature, pressure or hardness.

Methods of Determining Toughness

There are three methods of determining the factors of strength and ductility constituting toughness.

1. By making a tension test, which gives the elastic limit in pounds per square inch and the percentage of elongation in any desired length.

2. By making a cold bend test, from which may be determined the elastic limit in pounds per square inch and the number of degrees of permanent bend.

3. By making two tests: the hardness test, which gives the hardness numeral, and the cold bend test, which gives the number of degrees of permanent bend.

In each of these three methods two properties are determined, which when expressed as one versus the other (for example, by the first method, 45,000 lb. per sq. in. vs. 25 per cent.) convey a definite idea and an accurate estimate of the toughness of the metal.

The first method is probably the one most preferred because it is in most general use at the present time, and is therefore best understood. From the standpoint of economy it has the disadvantage that a rather complex test specimen must often be made; while if an unprepared specimen is used, a comparatively large size is required on account of the wedge grip used. Scientifically, the elongation obtained on a tension test specimen is indefinite. In annealed brass and copper the whole piece will elongate, while in the case of the harder metals most of the elongation is confined to the spot where the break occurs; so, in speaking of elastic limit versus percentage of elongation a somewhat vague idea of the toughness is given.

The bend test specimen does not have to be especially prepared. The elastic limit, ultimate strength and the

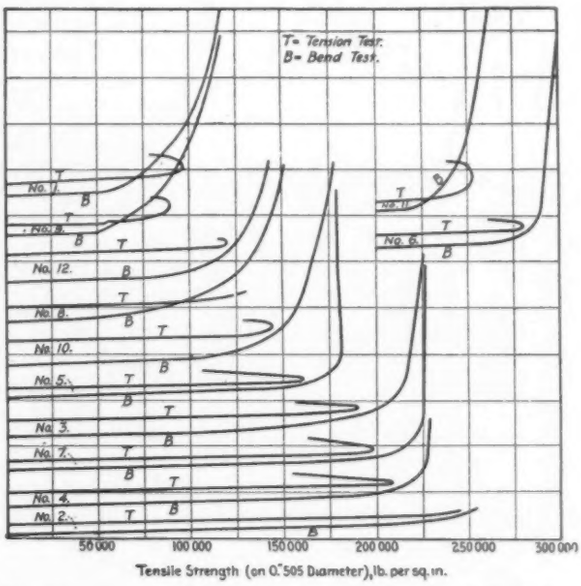


Fig. 1—Curves Showing Relation Between Tension and Bend Tests

number of degrees of permanent bend can be very clearly defined on the autographic chart, taken from a bend test. Further, the elongation on the tension side of the neutral axis is confined to a definite and known place, so that in speaking of degrees of permanent bend, we have a more accurate estimate of ductility than can be obtained from the elongation of the tension test specimen.

The third method is necessarily so approximate that it is not satisfactory for regular use in the laboratory; but as a "sub" or "deputy" test, it is so simple that it is by far the most generally used for inspection purposes in one modified form or other. This can be illustrated by the following example in actual practice: A number of gears are made and heat-treated in the same way as the master test specimen, the strength, hardness and ductility of which have been determined in the usual manner. Since in this case the heat treatment is for hardening, it will be necessary to test the gears for hardness only, to see that the hardness value agrees with that of the master specimen. This in turn assures the same toughness value in the gears as in the specimen.

In many instances a hardness test on soft steel, in connection with the ductility factor, has solved the problem

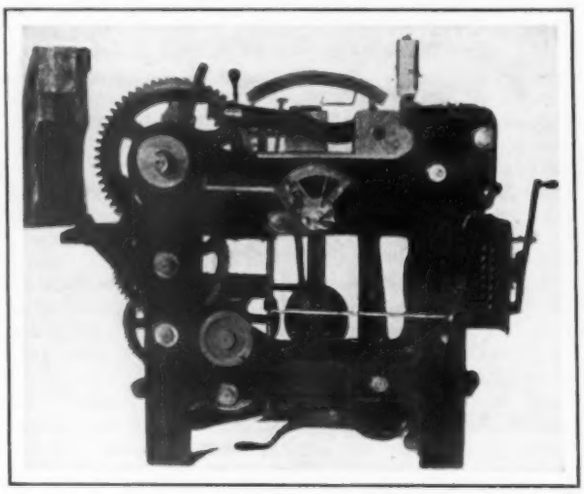


Fig. 2—Front View of the Shore Compensating Universal Testing Machine Equipped for Bend Tests

of individual piece inspection; and the method is being adopted by the railroads for testing car axles, etc.

It is also possible to test in this way the toughness of very large forgings or castings in a number of places, by sawing off a sliver, bending it in a vise and then measuring its hardness.

Relation of Bend and Tension Test Readings

The desirability of being able to resolve the readings of the tension test into those of the bend test, or vice versa, is evident to all. It is a well-known fact that a metal which shows a high tensile strength will show high values on almost any kind of strength test applied to the same piece, whether it be the bend, torsion, compression, shear or hardness test. According to experiments made by the writer, there is a definite relation between the results of the tension and bend tests. This is shown graphically in Fig. 1, on which are plotted stress-strain curves for tension (marked T) and autographic curves for the bend tests (marked B). The scale figures at the bottom of the diagram apply directly to the curves for tension only. The following list describes the steels and the heat treatment to which they were subjected; the numbers correspond to those on the curves in Fig. 1:

No. 1. Nickel steel, annealed.
No. 2. Vanadium tool-steel, hardened at 1500° F. in water, drawn 800° F.
No. 3. Chrome-nickel steel, hardened at 1500° F. in oil, left so.
No. 4. Nickel steel, hardened at 1500° F. in water, drawn 750° F.
No. 5. Chrome-nickel steel, hardened at 1500° F. in water, drawn 800° F.
No. 6. Machine steel, cold-rolled.
No. 7. Nickel steel, hardened in oil at 1500° F., left so.
No. 8. Vanadium tool-steel, hardened at 1500° F. in air blast, left so.
No. 9. Vanadium tool-steel, annealed.
No. 10. Chrome-nickel steel, annealed.
No. 11. Machine steel, hot-rolled.
No. 12. High-speed steel, annealed.

*A paper read at the meeting of the American Society for Testing Materials, Atlantic City, N. J., June 25, 1913.

Both the tension and bend tests were made on a new automatic and autographic machine of high precision, a view of which is given in Fig. 2. The

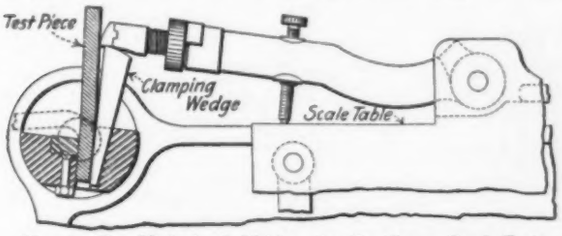


Fig. 3—The Method of Making the Cantilever Bend Tests

method of making the bend test is illustrated diagrammatically in Fig. 2. The ratio of supported length to thickness of specimen was 6 to 1. Since the power of the scale can be adjusted to any desired degree by use of a pendulum balance, and since the load on the free end of the bend test specimen is only a fraction (5 per cent.) of what would be required to rupture a tension specimen of the same area, the scale of each bend test curve has been enlarged twenty times. By this method the average relation between the ultimate strengths as indicated by tension and bend tests, the latter being made as above described, is constant within 5 per cent. plus or minus. The elastic limits show wider variation, averaging 10 per cent. plus or minus.

Special Double-Acting Single Cam Press

For the working of pliable materials under heat rather than metal, the Standard Machinery Company, 7 Beverly street, Providence, R. I., has evolved a special double-acting single cam press. The function of this machine is to heat the material that is being worked up to a temperature of 600 deg. as well as the actual working of the material. Fig. 1 is a front view of the press, while a rear view is given in Fig. 2.

The cutting ram, running between the outer gibs, is actuated by two connecting rods which straddle the crankshaft and operate at a stroke of 1 in. The center, or drawing or forming, plunger passes up and down through a bronze lining inside of the blanking ram, and also has a special and separate adjustment. The top of this ram is made in the form of a yoke and is supported by a spring adjustment to the upper part of the press frame. This ram is actuated by a single split cam which is made in halves

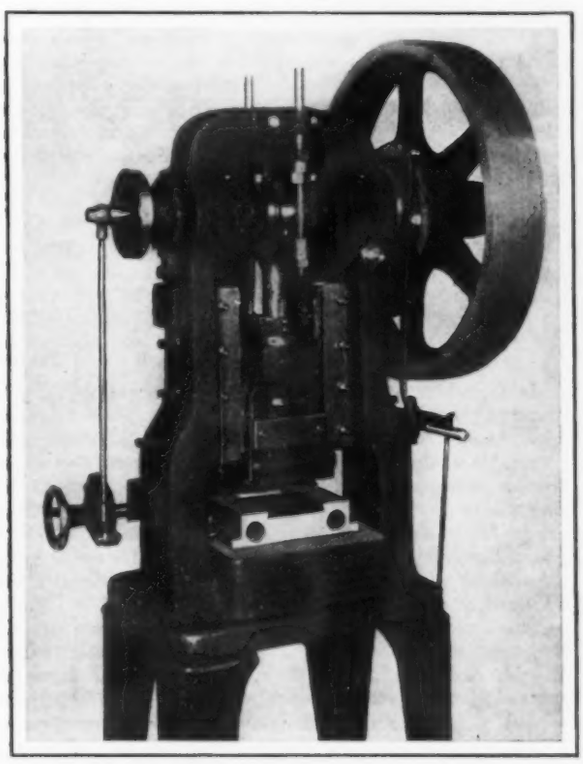


Fig. 1—Front View of the Upper Portion of a New Special Double-Acting Single Cam Press for Working Pliable Materials

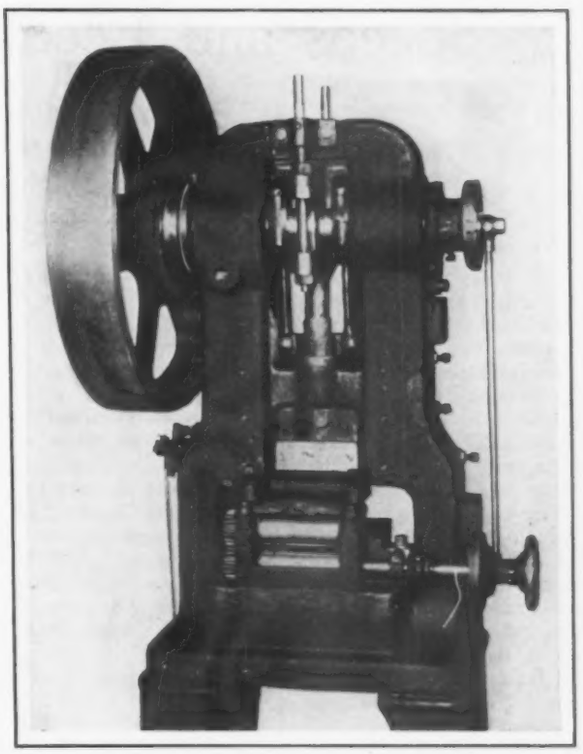


Fig. 2—Rear View of the Press Showing the Feed Rolls

and is hardened and ground. After the hardening process is completed, the cam is accurately fitted and is then taken apart and keyed and screwed on the center of the crankshaft directly between the upper boxes of the press. While the cutting stroke of the outer blanking ram is 1 in. the total drawing stroke of the inner ram is 1¼ in. When the press is started both rams start, the path of the cutting or outer ram being 1 in. The drawing ram travels downward 1¼ in. and it then dwells for one-quarter of the stroke, after which it draws the remaining part of the stroke, which is ¼ in.

On the bolster plate of the press is set a special die holder, and in Fig. 1 two holes can be seen in this which are for the insertion of electric terminals. There is a recess for two more terminals in the chuck or punch holder of the press, the latter being at right angles to those in the die holder, and there is one in the rear and the other in the front. The die holder is electrically connected, and as well as the punch holder is cored out on the inside, so that these portions of the press can be heated up to a temperature of 500 or 600 deg. The material is fed from the rear of the press through the roll feed, shown in Fig. 2, in the cold state. The center of the roll feed frame is located 8 in. from the center of the ram and is entirely separate from either the die or punch holders, thus permitting the temperature to be practically normal at all times. When the stock is passed through the feed it is received through the dies cold and the press is started and cuts the disk or disks from the sheet. The drawing ram then comes down and draws or forms them into the required shape. The object of allowing a dwell after 1¼ in. has been traversed is because the material is thick and this permits the impression to be made gradually which has the effect of making the design or formation much more distinct.

The following table gives the principal dimensions and specifications of the press:

Size of hole in bed, in.	7 x 9
Distance between uprights, in.	14
Distance between ram and bolster, in.	5½
Distance between center of shaft and top of bed, in.	26
Size of bed, in.	14 x 14
Adjustment, in.	1¼
Speed, r.p.m.	150
Diameter of flywheel, in.	27
Face width of flywheel, in.	4½
Weight of flywheel, lb.	300
Over-all hight, ft.	6
Floor space, in.	24 x 30
Weight, lb.	1600

In addition to building the press with a roll feed, it is planned to equip the machine with a dial feed for secondary operations or for special operations in combination with metal when required.

Speeds and Feeds for Machine Tools

Why and How Standardization in This Respect Should Be Agreed to by Machine Tool Builders

BY ROBERT THURSTON KENT*

It is an open question whether the users of machine tools realize to what an extent they are losing the full benefit of their machine tool equipment by not having their machine tools standardized, with respect to the feeds and speeds available. The event of high-speed steel and the publication of Taylor's "Art of Cutting Metals," revolutionized the construction of machine tools, particularly of lathes. The cuts and feeds which could be taken with this new steel necessitated the rebuilding of every machine tool in the country if the full advantage was to be taken of it. It is unfortunate, however, that when this rebuilding process was under way the manufacturers of machine tools did not realize that much greater advantage could be taken with high-speed steel if the various makes of machine tools of any given type and class had available the same range of cutting speeds and the same feeds.

In the "Art of Cutting Metals," Taylor gives a series of tables showing the cutting speeds which should be used on different classes of metals such as hard, medium and soft steel and hard, medium and soft cast iron. If a standard-shaped tool is to last at least 1½ hr. between grindings the cutting speeds called for by these tables in combination with the feeds and depth of cut specified are in excess, usually, of the speeds, feeds and depths of cut which are usually found in most machine shops. Only in those shops, as a rule, wherein the Taylor system of management is in use are tools run up to anything like the figures given in these tables. The reason is not far to seek.

The speeds and feeds given in Taylor's tables were computed largely by means of the Barth slide rule, which is

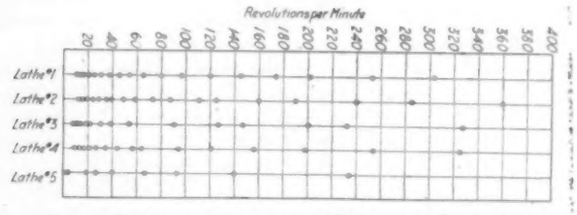


Fig. 1—Speeds Available on Five Different 18-In. Lathes

described by the inventor in a paper before the American Society of Mechanical Engineers.† This slide rule is fairly well known by this time and we will not go into its construction at any great length. Suffice to say that it combines all the various factors representing the depth of cut, the number of cutting tools in use, diameter of work, the speed combinations possible on the machine, the feeds available and the shape of tool. By setting the various slides of this rule at the proper factors, the speed and feed combination which, on the machine under consideration, will give the most economical result is readily found. It is obvious that a different slide rule is necessary for each machine tool which has different available speeds and different feed combinations from the other tools in the shop. A different slide also is necessary for each shape of tool which is used.

Two Things Possible with Standardized Machines

A a rule, when undertaking the installation of the Taylor system in a machine shop, one of the early changes put under way is the respeeding of all the machines so that all the machines of a given class will be provided with feed and speed combinations which are alike. Two things are accomplished by this change. First, it reduces the number of slide rules which have to be made, in itself no small item in a large shop, and, second, it permits the routing of work to anyone of a number of machines instead of to a single machine possessing the characteristics of speed and feed nearest to the proper combination as shown by Taylor's tables or the slide rule. This second feature is the one which will prove extremely profitable to the machine tool user if he goes to the trouble and expense of standardizing his machine tools. The writer has made a close study of the characteristics of engine lathes in connection with this point and proposes to give below a few examples of conditions which might easily obtain in a shop wherein the tools are not standardized with respect to feeds and speeds.

The 18-in. engine lathe is a good all-around tool which is found in the majority of machine shops doing other than the lightest kind of work. It is a tool which may be used alike for machining comparatively small castings and forgings and for handling pieces of considerable size entering into the make-up of heavy and powerful machinery. For this reason the 18-in. lathe is likely to be found in the machine shop the range of work of which covers a considerable field as regards weight. The writer therefore selected the 18-in. lathe as a fair example of lathe practice for the purpose of studying the question of feeds and speeds.

Analyzing Speeds and Feeds of Five Lathes

Five well-known standard makes of lathe were selected. These five lathes might easily be found at any one time, in any one medium-size machine shop. As a matter of fact, the writer has encountered four of the five at one time in one shop. Four of the lathes selected for study were belted lathes, with cone pulleys and back gears, and the fifth lathe was one of the newer type of all-geared-head machine. Three of the belted lathes and the all-geared-head lathe were provided with two-speed countershafts. The remaining belted lathe was provided with a single-speed countershaft and double back gears. The available speeds of all these machines were stated by the makers to be in geometric progression. Plotting the speeds, however, revealed that some of them were very far from being in geometric progression and that there were large gaps in the speed range, which put the user of the machine at a serious disadvantage in machining pieces of certain diameter. Table I shows the principal speed and feed characteristics of the different machines.

Table I.—Speed and Feed Characteristics of Five 18-in. Engine Lathes

No. of lathes	No. of speeds	Speed range, r.p.m.	No. of feeds	Feed range
1	18	12 to 340	36	12 to 180
2	18	12.6 to 360	40	5 to 80
3	16	8.5 to 580	36	9 to 480
4	16	10 to 420	36	9 to 480
5	9	0.75 to 235	32	10 to 300

It is evident from Table I that there must be comparatively few speeds on any one of the five machines which agree with one another, and this is even more noticeable in the feed range. Plotting the speeds on cross-section paper, as shown in Fig. 1, reveals this to be the case. In a few cases the speeds on one or two machines are in fairly close agreement at several points along their range, but for the most part no machine has a speed available which even fairly closely approaches that available on another machine.

To illustrate what this means in actual shop practice a few typical possible turning operations were selected and speeded according to the Taylor rules. Three diameters were chosen, any one of which might be turned in any one of the lathes under consideration, namely, diameters of 16 in., 10 in. and 6 in. Three depths of cut which are commonly used in lathe work were considered for each diameter, namely, ⅜ in., ⅛ in. and 3/32 in. With these

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†Slide rules for the machine tool as a part of the Taylor system of management, by Carl G. Barth. Trans. A. S. M. E. Vol. 25, page 49.

various depths of cut a number of different feed combinations are possible. For the purpose of study with the 3/8-in. depth of cut the following feeds were chosen, 1/64 in., 1/32 in. and 1/8 in. With the 3/32-in. depth of cut feeds of 1/64 in. and 1/16 in. were used. Referring to the Taylor tables, as abridged on pages 1244 and 1245 of the eighth edition of Kent's Mechanical Engineers' Pocketbook, the best proper speeds to be used with the various combinations of feed and depth of cut, with a standard-shaped high-speed tool of Taylor-White steel, are found to be in Table II for soft cast iron and a 5/8-in. lathe tool, the size specified by the makers for this size of lathe.

Table II.—Cutting Speeds for Various Depths of Cut and Rates of Speed

Depth of cut, in.	Feed, in.	Cutting speed, ft. per min.	R.p.m. 16-in. dia.	R.p.m. 10-in. dia.	R.p.m. 6-in. dia.
3/8	1/64	156	37.2	49.6	99.3
3/8	1/32	116	27.6	36.9	73.8
3/8	1/16	79.7	19	25.3	50.7
1/8	1/64	200	47.6	62.7	127.2
1/8	1/32	148	35.3	47.1	94.2
1/8	1/8	69.6	16.6	22.4	44.4
3/32	1/64	216	51.5	68.8	137.5
3/32	1/16	110	26.2	35.5	70

Any one of the jobs might occur at any time in any machine shop. Let us see how it would fit in any one of our five standard lathes. Tables III, IV and V show how

Table III.—Available Speeds for Various Cutting Speeds on a 16-in. Diameter

Desired cutting speed.	R.p.m. on 16-in. diam.	Nearest available speed, r.p.m. Lathe No. 1.	Lathe No. 2.	Lathe No. 3.	Lathe No. 4.	Lathe No. 5.
69.6	16.6	17.4	16.0	13.4	16.5	3.25
79.7	19.0	17.4	19.0	18.7	16.5	19.1
110.0	26.2	25.3	24.0	21.7	26.8	26.4
116.0	27.6	25.3	24.0	21.7	26.8	26.4
148.0	35.3	30.4	36.0	30.3	34.4	26.4
156.0	37.2	38.0	36.0	30.3	34.4	40.0
200.0	47.6	46.0	38.9	38.8	44.0	40.0
216.0	51.5	46.0	49.2	38.8	44.0	....

Table IV.—Available Speeds for Various Cutting Speeds on a 10-in. Diameter

Desired cutting speed.	R.p.m. on 10-in. diam.	Nearest available speed, r.p.m. Lathe No. 1.	Lathe No. 2.	Lathe No. 3.	Lathe No. 4.	Lathe No. 5.
69.6	22.4	21.0	19.0	21.7	21.1	19.1
79.7	25.3	25.3	24.0	21.7	21.1	19.1
110.0	35.0	30.4	36.0	30.3	34.4	26.4
116.0	36.9	38.0	36.0	30.3	34.4	26.4
148.0	47.1	46.0	38.9	38.8	44.0	40.0
156.0	49.6	46.0	49.2	38.8	44.0	40.0
200.0	63.7	54.0	58.5	54.0	56.7	40.0
216.0	68.8	66.0	58.5	54.0	56.7	67.0

Table V.—Available Speeds for Various Cutting Speeds on a 6-in. Diameter

Desired cutting speed.	R.p.m. on 6-in. diam.	Nearest available speed, r.p.m. Lathe No. 1.	Lathe No. 2.	Lathe No. 3.	Lathe No. 4.	Lathe No. 5.
69.6	44.4	38.0	38.9	38.8	44.0	40.0
79.7	50.7	46.0	49.2	38.8	44.0	40.0
110.0	70.0	66.0	58.5	54.0	56.7	67.0
116.0	73.8	66.0	73.8	54.0	74.0	67.0
148.0	94.2	97.0	87.5	91.0	95.0	93.0
156.0	99.3	97.0	87.5	91.0	95.0	93.0
200.0	127.2	120.0	126.5	122.0	121.0	93.0
216.0	137.5	120.0	126.5	127.0	121.0	140.0

closely these desired number of revolutions per minute necessary to give the required cutting speed can be obtained on any one of the five lathes. An inspection of these tables will show that any one of the cutting speeds desired can be obtained within a fairly close approximation on some one of the five lathes. In a few cases some of the speeds can be closely approximated in two of the lathes. The remaining lathes, however, have not speeds available which will give a cutting speed within 15 to 50 per cent., as a rule, of that desired. This is shown graphically in Fig. 2, which is an enlargement of a portion of Fig. 1, with several of the various revolutions per minute called for by the most economical cutting speed plotted in the form of horizontal lines. The relative position of any one of these horizontal lines and of the points representing available speeds in the different lathes indicates how closely the desired speed could be obtained in any one of the five machines.

To examine two or three of the cases in detail let us consider calling for a depth of cut of 1/8 in. and a feed of 1/32 in. on the 16-in. diameter. The cutting speed in this case, as shown by Table II, for 148 ft. per minute corresponds to 35.3 r.p.m. Referring now to Fig. 2 it will be observed that this speed can be obtained fairly close on lathe No. 2 with 36 r.p.m. and lathe No. 4 with 34.4 r.p.m. The nearest on lathe No. 1 is 38 r.p.m., which is 10 per cent., too high to put the job on this lathe. It would be necessary to drop back to the next lowest speed, 30.4 r.p.m., which is 14 per cent. lower than is necessary for the most economical performance. Lathe No. 3 is about in the same condition, as regards this job, as lathe No. 1, while lathe No. 5, with its comparatively few and widely separated speeds cannot come within 26 per cent. of the economical speed. It is probable that a change in

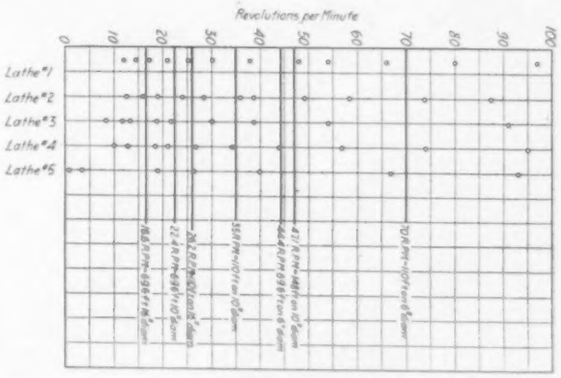

Fig. 2—A Comparison of Required Cutting Speeds and Speeds Available on Five 18-In. Lathes. See Tables III-V

the feed and depth of cut combination would bring the job closer to one or the other of the available speeds of lathes No. 1, No. 3 or No. 5. But it is also more than probable that the speed required for this combination would be a long ways from the available speeds on lathes No. 2 and 4.

If we get into the higher speeds, such as could be called for by a 1/8-in. cut with 1/32-in. feed on a piece 6 in. in diameter, we have even less choice than before. The cutting speed here called for is 148 ft. per min., corresponding to 94.2 r.p.m. The only average speed which even closely approaches that called for is 95 r.p.m. on lathe No. 4, which is a trifle higher, but the only probable effect of which would be to require grinding the tool in a slightly shorter interval than was contemplated. The next lower speeds available on the other machines are far below the economical possibilities of machine work.

What Follows in the Shop with Different Make Lathes

Using lathes of such widely assorted character as indicated above, and which is a condition existing in hundrds, even thousands, of shops to-day, the manufacturer has two courses open to him, aside from respeeding, either one of which will be productive of more or less loss. First, he may route his work to the machines irrespective of the feeds and speeds available, and use the next lowest speed to that called for for the best result. If he adopts this course he is not getting the full advantage which should accrue to him from the use of high-speed steel, and the capacity of his shop is thereby lowered. On the other hand, he may route the work to those machines which have the feeds and speeds available which are nearest to those necessary for economical production. This will result in one or two lathes receiving the bulk of the work while the other machines receive comparatively little. Thus some of the lathes in the shop will be choked with work, while others have little or nothing to do. It is an open question whether the second case is not worse than the first.

The losses which a manufacturer will sustain due to the causes outlined will be largely eliminated if all the lathes in the shop are standardized as regards their speeds and feeds. That particular combination of depth of cut and feed can be adopted which will call for a cutting speed which it is within the possibilites of the machine to deliver. Every machine in the shop can then be worked at its maximum capacity and the production of the shop materially increased. Furthermore, work can be placed in any one of the different lathes in the shop with the certainty that one machine will do the job as well and as economically as any other.

Standardization to Ascertain Exactly a Machine's Capacity

Not the least advantage, however, which will result to the manufacturer by the standardization of the feeds and speeds of his metal-working tools, is the absolute knowledge which it will give to him of the proper time which

any job should consume. As especially pointed out by Mr. Taylor, most of the trouble in machine shops over questions of piece-rates and wages is due to the fact that the management of the concern does not know the capabilities of either its machinery or its workmen. The standardization of the machines will eliminate in a large measure this uncertainty. The experiments of Taylor have established very definitely what speeds, feeds and depths of cut will give the maximum production in connection with the use of high-speed steel tools of certain standardized shapes. These data are in the form of tables which are available to all. Knowing the amount of material which must be removed, and the feed which his machine will stand, the table immediately gives the most economical cutting speed.

With the machines standardized so that the cutting speed can be obtained, or a speed which closely approximates it, the manufacturer is able to say to his workman: "With a standard shape of tool, taking a depth of cut of so much, with a feed of so much, and putting the belt on the third step of your cone, with the second pair of back gears in, you will be able to do this job in 35 min." With definite information at hand of this character, there should be no difficulty in fixing fair piece-rates, or requiring a fair standard of production to be maintained under the day-wage system. If, however, the machines are not standardized, it will be impossible to give to the workman any definite information as to what he should do as regards speeds, feeds and depths of cut. For instance, let us consider the five lathes cited above. Consider that lathes Nos. 1 to 4 are filled with work for some time ahead, and that a job coming through should ordinarily be put on lathe No. 2. A consideration of the job and reference to the Taylor tables shows a cutting speed of 216 ft., corresponding to 51.5 r.p.m. on a 16-in. diameter. The only lathe available is lathe No. 5 and the nearest available speed is 40 r.p.m., giving a cutting speed of 167.6 ft. Obviously, with this discrepancy between the necessary and available speeds, he could not give to the workman the definite information which would enable him to turn out a job in any specified length of time.

Machine Builders Urged to Agree on Standards

One of the corner-stones of scientific management is the definite setting of tasks for the workmen. Scientifically managed shops have found it impossible to set tasks without first having standardized conditions. As a setting of tasks causes an astonishing increase in production, it obviously is a good investment for any employer to standardize his machines along the lines indicated.

It is not the purpose of this article, however, to urge upon the individual manufacturer the desirability of standardizing his machine tools so much as it is to point out the desirability of machine tool builders agreeing upon certain standard characteristics as regards feeds and speeds of standard machine tools. There is no more reason why an 18-in. lathe turned out by one manufacturer should have a different feed and speed range than there is why two locomotives turned out by different locomotive shops should have different gauges. It is obvious if a speed range of 12 to 304 r.p.m. in 18 steps is right, that a speed range of from 8.5 to 580 r.p.m. with a fewer number of speeds is wrong, and it is still more obvious that a speed range of 0.75 to 235 r.p.m. with only half the number of speeds is still further wrong. It would seem the proper thing for the machine tool builders to get together and agree among themselves what are the best speeds and feeds for each standard size of lathe, taking into consideration the available data on the use of high-speed steel, and then to build these lathes and no others, unless the customer is willing to pay the price for special machinery. Economies both to builder and user would amply warrant such a stand.

Positive Acting Press Safety Devices

New Mechanism Designed by the American Steel & Wire Company to Take This Machine Out of the Ultrahazardous Class

Two positive acting safety devices have been developed at one of the Worcester plants of the American Steel & Wire Company by two of its employees. They are of much interest from the fact that they should play an important part in removing the power press from the ultrahazardous class where it stands in almost the front rank. The danger is always great that the operator, through absent-mindedness or deliberate carelessness, will permit his fingers or hands to remain beneath the plunger as it descends, with resultant serious maiming and there always exists the possibility of a press repeating or making a stroke unexpectedly when the operator is not prepared.

The percentage of injuries received in the operation of presses is exceptionally large, and there is probably no other class of machinery that is more prolific of serious accidents. These devices are samples of the many forward steps taken by this corporation through its provisions for safeguarding its employees and also tends to show the co-operation of the employee with the employer in promoting safer working conditions. The two devices, while differing in details of design, accomplish the same result; that of sweeping the hands of the operator out of the way of the plunger. It is impossible to prevent this action, even should the employee be very careless, as the full energy of the press is back of the mechanism. One of the devices which is designed for small work is illustrated in Figs. 1 and 2, while Figs. 3 and 4 show the device which is adapted for use when heavier work is being handled.

The device illustrated in Figs. 1 and 2 is used where small work has to be fed to and removed from the press by hand. In the case illustrated, the machine is equipped to punch a hole in the end of a flat spring. On the press frame is a vertical rocker arm, B, made up of a quarter-turned piece of flat stock which oscillates in its bearings and has the sweep C fastened to its lower end. The press plunger carries a cam arm, A, that travels on the rocker arm and gives it a rotating motion which with the downward stroke is transmitted to the sweep, causing an upward movement. When the plunger is in its raised position, as shown in Fig. 1, the sweep is directly in back of and close to the work. The offset on the arm C carries the sweep back far enough so that the operator's hand can extend directly over the work, thus enabling him to charge the press without interference. As the plunger descends, the sweep travels forward and if there were a hand in the way it would be pushed out of danger. The device shown in Figs. 3 and 4 is designed for use where the work is heavier, or, at any rate stands higher on the table. The sweep apron D, which is of sheet metal, is carried on a horizontal rocker arm, H, on the front of the table, having a step lever, E, on one end. The operation of the device is accomplished by the action of the rigid arm F fixed to the plunger on the step lever E. In Fig. 3 the plunger is in its raised position ready for the introduction of the stock. At this time the sweep lies flat on the press table out of the way of the operator so that he has easy access to the dies in placing his stock. With the descent of the plunger the rod F comes in contact with the step lever and forces it downward, causing the apron to rise to its vertical position. The press plunger in its down position is illustrated in Fig. 4. Should the hand of the operator have been permitted to remain over the work, it would have been swept out of the way, as can be readily seen. As the plunger ascends the spring G returns the apron to its flat position ready for the next stroke. The depressed tongue in the center of the apron affords an opportunity for the operator to observe the work and the mechanism, one reason for this being to satisfy the sense of curiosity developed when parts of the machine that a man has been accustomed to see are hidden by safety guards.

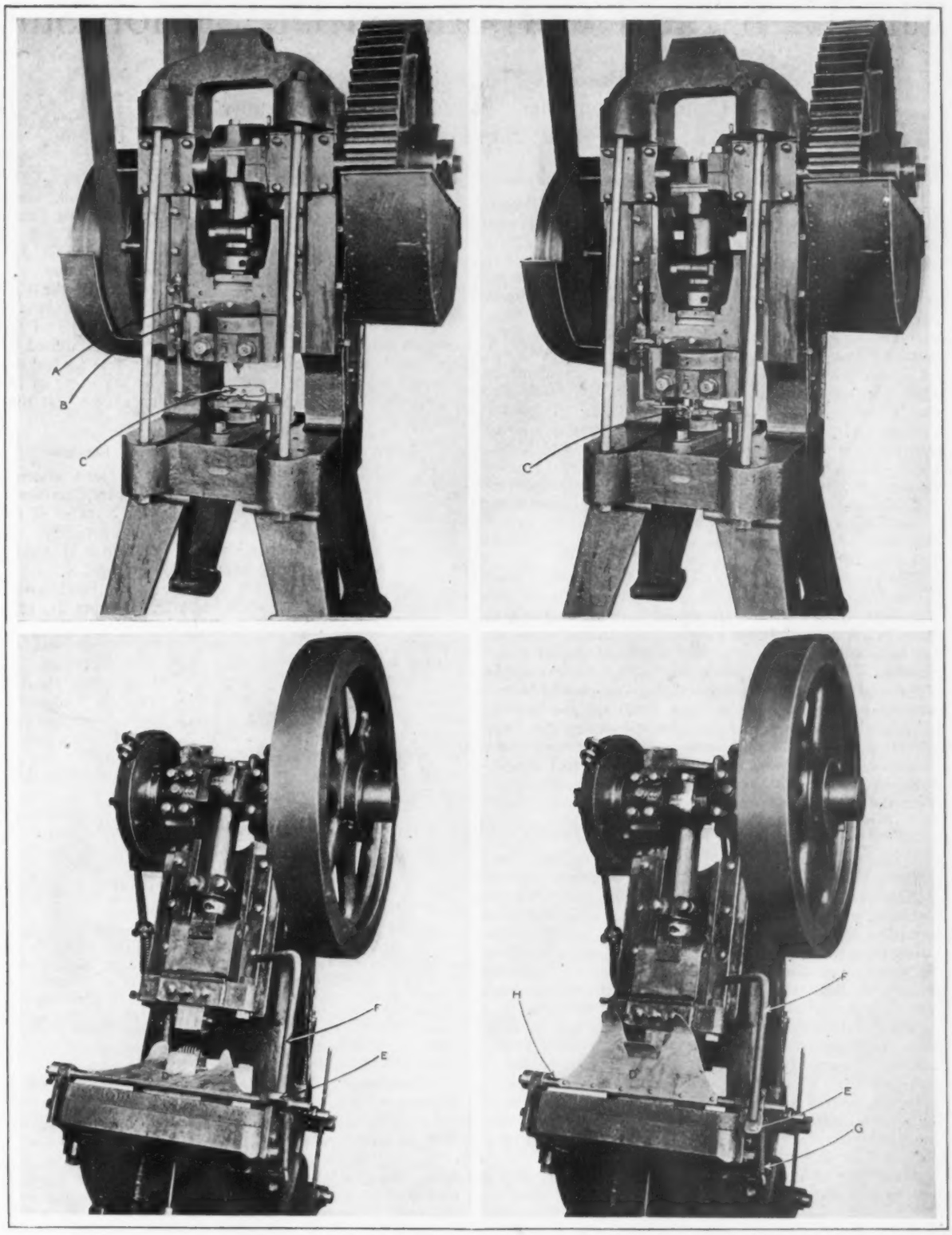

Fig. 1—Power Press Equipped with a Mechanically Operated Sweep for Brushing Employee's Hands Away from Danger. Device in Position for Handling Work

Fig. 2—Sweep in Outward Position after the Plunger has Descended

Fig. 3—Press Equipped with Apron Sweep. In Position for Handling Work

Fig. 4—Sweep Thrown into Vertical Position by Descent of Plunger

VIEWS OF TWO NEW POSITIVE ACTING SAFETY DEVICES FOR PRESSES DEVELOPED BY THE AMERICAN STEEL & WIRE COMPANY

The plant of the American Case & Register Company, Salem, Ohio, which was recently offered for sale by R. S. Kaylor, receiver, has been bought by S. Grove as trustee representing a number of Salem and Alliance men who were creditors and stockholders of the company. The purchase price was $65,600. It is stated that the company will be reorganized and that additional capital will be put in the business.

The Emerson Laboratory has outgrown the quarters occupied at 177 State street, Springfield, Mass., for 10 years, and has secured the greater part of the second floor of the new Chapin Building at 145 Chestnut street. Taking lease during the construction of the building, it has been possible to adapt the space to the special needs of the laboratory, thus securing a model of arrangement and convenience, now fitted with the latest and most approved apparatus.

The U. S. Steel Corporation Dissolution Suit

Defense Presents Testimony Regarding Its Cement Properties, the Tennessee Company Acquisition and the Garfield Investigation

E. M. Hagar, on the Corporation's Cement Business

At the hearing on Tuesday, June 24, Edward M. Hagar, president Universal Portland Cement Company, Chicago, subsidiary of the United States Steel Corporation, was the first witness. Questioned by counsel for the corporation, he gave a description of the operations and growth of his company. It had its beginning in 1900, when the Illinois Steel Company established the manufacture of cement from blast furnace slag which had been previously used for railroad ballast or for filling. The company, however, was not formally organized until 1906. It now has plants at South Chicago, Ill., Buffington, Ind., and Universal, Pa., near Pittsburgh, with capacities respectively of 500,000, 8,000,000 and 3,500,000 barrels per year, making a total of 12,000,000. It is also building a plant at Duluth, Minn., which will be completed in 1914 and is expected to prove the most important plant of the company in reducing cost of production. This has been a feature of the operations of the Universal Company, which is now making 19 per cent. more cement yearly than was made by all the cement companies in the country in 1900.

The cement business, Mr. Hagar said, is largely a local one, as freight rates have an important bearing on the cost of concrete construction. He stated that the building of plants of his company close to points of heaviest consumption has resulted in a decrease in the cost of cement to the consumer. His company has spent more than $500,000 in advertising the use of cement, sending out pamphlets and conducting lectures. The average profit on the cement, he said, since the organization of the company has been 20 cents per barrel. He was not cross-examined, as Judge Dickinson, of Government counsel, objected to his testimony on the ground that it was irrelevant and did not affect the issues of the case.

Pool Commissioner William C. Temple Testifies

William C. Temple, who for a number of years was commissioner for pools or associations of manufacturers of structural steel plate and steel shafting, described the operations of those associations. He stated that they were formed in 1897, and he became commissioner in 1898. Uniform prices were maintained and business was allotted to the members according to their percentage of the total production, that percentage being changed nearly every year. He described the system of penalties in force.

These associations, he said, came to an end in 1904, when the representatives of the Steel Corporation's subsidiaries announced that they had positive instructions to withdraw from all of them. He was ordered to clean up the pools, destroy all records of meetings and wipe everything connected with them out of existence. He was sure that Judge Gary never attended any of the meetings. On this point he said:

I am sure of that for several reasons. One is, that I was greatly desirous of seeing him become a member. Our members had frequent discussions as to the legality of the pools. I knew Judge Gary slightly and I knew he was a great stickler on the legal proprieties of business. I looked forward to his appearance at these meetings with a view to asking his opinion on certain matters connected with the pools. I was disappointed because he did not join.

Mr. Temple testified that after the pools came to an end the members occasionally held meetings but never discussed prices or allotment of business, talking about the trade outlook, costs, new methods, new concerns in the business and other such matters.

General Solicitor MacVeagh on Wire Pools

Charles MacVeagh, general solicitor of the Steel Corporation since its formation, testified that his attention was directed to the wire pools in the winter of 1908-09 by Judge Gary. Mr. MacVeagh continued:

Right after that Frank Baackes of the American Steel & Wire Company came to me and said, "Judge Gary told me to follow whatever instruction you give with regard to pools." I said, "You will have to get out of the pools." He said, "All right. If you tell me to do so I will, but I have had advice from counsel that there is nothing illegal about these pools."

In cross-examination Judge Dickinson asked if Mr. MacVeagh, as general solicitor of the corporation, had ever been consulted prior to 1909 by officers of the subsidiary companies as to pools. Mr. MacVeagh answered in the negative, but said it was possible that some of the division counsel of the corporation had been consulted by Mr. Baackes and others. He further said that he had not received reports from division counsel or any other of the regular legal counsel of the corporation saying that they had given any advice on this subject.

Lewis Cass Ledyard on the Tennessee Purchase

On Wednesday, June 25, Lewis Cass Ledyard, attorney at law, told again, as he had before the Stanley Committee, of his part in the events that led up to the transfer of the Tennessee Coal, Iron & Railroad Company's property. He came into the matter as attorney for Col. Oliver H. Payne, to whom Moore & Schley were heavily indebted.

Colonel Payne called his attention to the condition of Moore & Schley in the week beginning October 21, 1907, saying that they were very much extended and had a great quantity of Tennessee Company stock, which was regarded as a pooled or pegged stock and, therefore, had become unavailable as collateral. On Friday of the following week, November 1, Mr. Schley asked Mr. Ledyard to come to his office and told him that Colonel Payne had suggested that he ask Mr. Ledyard to see J. P. Morgan and ascertain whether the Steel Corporation would not buy the stock. Mr. Schley told him his loans amounted to $33,000,000 or $35,000,000. He saw Mr. Morgan at his library the next morning, and E. H. Gary and H. C. Frick were sent for. Mr. Morgan expressed himself as greatly concerned. Judge Gary was averse to making the purchase, saying the stock was not worth more than 60 or 65, whereas it would have to bring par to let Moore & Schley out. Said Mr. Ledyard:

I told Judge Gary that it was not a question of what it was worth, if they were going to do this thing, but a question of how much it was necessary to pay if they wanted to save Moore & Schley and avoid the very serious results that would follow their failure. "I don't doubt," I said, "that if you wait you can buy it for 25 cents on the dollar, but I don't think, when that time comes, if this situation is not saved, the Steel Corporation will be buying anything at any price."

According to Mr. Ledyard, Mr. Morgan exerted no pressure to bring about the purchase. While he was talking with Mr. Morgan in his library on Sunday, he said Mr. Morgan said:

I never have been more concerned over a situation than I am over this. I think this is the most serious thing we have had to meet in this panic yet. I cannot urge it upon the Steel Corporation to take this property. I have done what I can. I have put it before them. I hope they will do it, because I hope for the safety that that will bring in saving the situation.

Mr. Ledyard quoted Mr. Frick as saying:

If we do this thing, it is for the purpose of saving the financial situation. Here are these trust companies in trouble and if they fail it will bring about the same results as the failure of Moore & Schley. I think we ought to lend our aid to Moore & Schley conditioned upon the safety of these trust companies being first secured.

Mr. Ledyard told him such a condition was impossible and one thing must be done at a time.

The Care Taken in Getting Statistics of Production

C. K. Winslow, a clerk under Comptroller William J. Filbert, was a witness June 25, and testified to his having been connected with the Steel Corporation as a statistician since its formation. In August, 1912, he said, President Farrell wrote to steel manufacturers throughout the coun-

try asking their permission to use the American Iron and Steel Association's records in preparing statistical evidence for use in this case. The evidence was to be largely in the form of tables showing the comparative production of the Steel Corporation and the independents. Permission was granted. As a result, Mr. Winslow went to Philadelphia and obtained in the office of the American Iron and Steel Association the data needed by the Steel Corporation. He testified as to the accuracy with which the association's figures were copied.

President Crawford Examined

Later on the same day George G. Crawford, Birmingham, Ala., president Tennessee Coal, Iron & Railroad Company, testified that he was elected to his present office in the fall of 1907, and described the condition in which he found the Tennessee Company's properties at that time. He said the equipment was obsolete and in poor condition and since the Steel Corporation has had control $19,714,000 had been expended for improvements. The mill cost of producing rails at the plant at that time, he said, was $29 per ton. Only about 60 to 65 per cent. of the rail steel per heat then went into finished rails. The rest had to be remelted. The organization at the plant, he said, was not in good shape in 1907.

The Harriman Rail Order

Continuing his testimony on June 26, Mr. Crawford went into details regarding the manner in which the famous Harriman order for 157,500 tons of rails placed with the Tennessee Company early in 1907 had been filled. This is the order considered by the Government as having put the Tennessee Company "into a position of an actual competitor that could not be ignored, of great potentiality." Many of these rails, said Mr. Crawford, were defective. So defective were they that the Harriman system ordered deliveries stopped and refused to order any more rails from the Tennessee Company until 1909, when an order was given as a result of railroad officers having received favorable reports on the quality of rails made in 1908, under the régime of the Steel Corporation.

Having brought about great improvements in rail making at the Tennessee plant, Mr. Crawford said, by May, 1900, fully 90 per cent. of the rail heats were converted into finished rails, compared with 60 to 65 per cent. at the time the Tennessee Company was taken over by the corporation. The mill cost of manufacturing rails was also reduced to $20 per ton.

At the time the Tennessee Company was acquired, he said, most of its coke was made in beehive ovens, a small part being made in by-product ovens. Since that time, by-product ovens of the Koppers type, having an annual capacity of 1,200,000 tons a year, have been installed, the use of which has reduced the cost of making coke more than $1 per ton.

Advantages and Disadvantages of Birmingham Districts

An important advantage in iron making in the Birmingham district, Mr. Crawford said, is the proximity of ore, coal and limestone. Another advantage is offered by the climate. A further advantage is the fact that the iron ore contains lime. On the other hand, a disadvantage is that the South is mostly an agricultural country and does not consume steel in the same volume as the North. For that reason the Tennessee Company has to add considerable in freight rates on everything that it sells, as its markets are in sections remote from Birmingham.

The advantage in the ore containing lime, he said, is counterbalanced by the low iron content of the ore. The shortness of the winter is counterbalanced by the longer summers. Then, too, he said, labor in the South is not as efficient as in the North. The greatest disadvantage, however, is the necessity of shipping the products so far to get a market.

The Tennessee Company, he continued, has to get all its ingot molds from the North, paying a freight rate of $5 to $6 a ton. It costs $2 more per ton to make steel in the Birmingham district than in the Pittsburgh district, he asserted, this being due mainly to the fact that the availability of scrap in Pittsburgh allows makers to use 40 per cent. of it in their heats. The Tennessee Company cannot use more than 20 per cent. of scrap in its heats.

Judge Dickinson, in cross-examination, asked:

From what you have said, you do not have much faith in the future of iron and steel manufacture at Birmingham by the Tennessee Company?

A. Well, it is a low grade proposition, and the only way we could save what is there is to develop it like a low grade proposition; that is, on a large scale. The future of the Birmingham district is one that cannot be made like the rosy pictures I have heard described, but it can develop into a reasonably good business proposition.

Q. I want to know if you think the future is poor.

A. The future is as good as that of any other iron district I know.

Q. Is it not a fact that there has been a development in all lines of industry in the South since the Civil War, and that this development now is going on rapidly?

A. Yes, that is true. But there is not a proportionate development in the consumption of iron and steel products.

Judge Dickinson produced the minutes of a meeting of the sales managers of the subsidiaries of the Steel Corporation held in New York, November 20, 1908. At this meeting Col. H. B. Bope called attention to a map on which was drawn a line from Norfolk, Va., west to the Pacific coast, remarking that all the territory south of this line could be reached by the Tennessee Company on terms of equality with the manufacturers in the Pittsburgh and Chicago districts, "presuming a common freight rate."

Mr. Crawford explained that this line merely indicated the points to which the Tennessee Company could ship at the same or lower freight rates than the plants in other districts. He stated, however, that it did not indicate the territory in which the Tennessee Company could compete with other companies since it did not take into account the difference in the costs of production.

Former Commissioner Garfield Testifies

On the same day James R. Garfield, who was Commissioner of Corporations and later Secretary of the Interior under the Roosevelt Administration, declared on the stand that his investigation of the Steel Corporation as head of the bureau of corporations failed to establish that the corporation had ever been in violation of any part of the Sherman anti-trust law. This was the first time that Mr. Garfield ever testified on Steel Corporation matters. He said:

I began my investigation of the Steel Corporation in the latter part of 1902. That was a preliminary work, and the specific inquiry began later, about 1905, I think. My investigation was most exhaustive and I examined every available paper or report I could obtain. I had expert assistance in the task. Through Mr. MacVeagh, the solicitor-general of the corporation, I met Judge Gary. I explained to him the purposes of the investigation and the policy of the bureau of corporations. The purposes of the investigation were to get at the facts regarding the Steel Corporation and the steel business as a whole.

Judge Gary said it was his desire to assist the bureau in every way. He wanted the President and the Secretary of Commerce and Labor to understand that he was heartily in favor of the investigation, and on account of this I arranged a meeting between him and Secretary Metcalf.

A memorandum setting forth the data desired by the bureau of corporations was put in evidence. The preparation of the memorandum, let alone the furnishing of the information, took many months, Mr. Garfield said, but Judge Gary instructed that everything be given to the investigator. So far as the witness knew these instructions were obeyed, as every bit of information wanted was furnished.

What Mr. Garfield Found

Mr. Lindabury, of counsel for the defense, asked:

Did you ever make a report to President Roosevelt of the result of your investigation of the Steel Corporation compared with your investigation of any other corporation?

A. Yes, oral reports were made from time to time regarding the progress of the investigations. So far as I know there were no written reports made during this stage of the inquiry. My reports to the President said that I never found in the Steel Corporation any conditions regarding rebates and unfair methods of competition as I did in the case of the Standard Oil Company. I never found a complaint from any Steel Corporation competitor as to his treatment by the corporation. I never found that the Steel Corporation had been involved in any rebate proposition or in any pool.

Mr. Lindabury then wanted to know about Mr. Garfield's knowledge of the Tennessee Company deal.

A. President Roosevelt asked me if I knew of any reason why he should not take the action he finally did, and I told him I did not. The President asked me if the bureau had discovered any point in its investigation of the Steel Corporation which might bring about a report to the Department of Justice asking for a prosecution, and I told him there was no such point.

Q. Then did your investigation show any improper practice whatsoever by the Steel Corporation?

A. It did not, and there was nothing which I believed could be interpreted as suspicious about the Steel Corporation.

On cross-examination by Judge Dickinson, Mr. Garfield said that during his inquiry he never examined a witness under oath, although he had the legal right; that he had never examined the minutes of the corporation or any witness outside of the corporation. He explained that the investigation he made on the rebate question was along the same line as that he made of the Standard Oil Company, where he did find rebating. But there was none of this business in the Steel Corporation, he reiterated.

The hearing was then closed for the summer. It will be resumed about October 1, and will again be conducted in New York City.

The Westinghouse Machine Company

Now in the Hands of Stockholders After Five Years Under Receivers

The annual meeting of stockholders of the Westinghouse Machine Company was held at East Pittsburgh on Tuesday, June 24, at which the following board of directors was elected: George Westinghouse, H. H. Westinghouse, H. M. Brackenridge, J. D. Callery, H. T. Herr, J. R. McCune, John F. Miller, Horace E. Smith and W. D. Uptegraff. T. S. Grubbs, secretary of the company, made a report to its stockholders, which in part was as follows:

The net earnings for the last fiscal year, ended March 31, 1913, before deduction of interest charges, were $500,030.12, as compared with $180,874.22 in the previous fiscal year. In the year just closed the total billing in product of the company's manufacture was $3,841,000; practically $400,000 more than in the previous fiscal year. A summarized comparison of the results of operations during the fiscal years ended March 31, 1912, and 1913, follows:

	1912-13	1911-12
Shipments billed	$3,840,972.97	$3,440,790.44
Net manufacturing profit after deducting allowances for depreciation	$439,669.26	$164,011.77
Dividends received and other income	123,577.93	123,149.33
Total	$563,247.19	$287,161.10
Less deductions from income	63,217.07	106,286.88
Net earnings applicable to interest, dividends or capital accounts	$500,030.12	$180,874.22
Interest charges	418,338.95	478,933.73
Net earnings after payment of interest charges	$81,691.17	$298,059.51
Less charges to surplus	42,729.27	5,772,928.68
Net addition to surplus	$38,961.90	$6,070,988.19

The charges against surplus account shown above in the year ended March 31, 1912, amounting to approximately $5,800,000, principally represent adjustments in book values of certain investments acquired many years previously; and the same item in the year ended March 31, 1913, amounting to approximately $43,000, consists in the main of charges in connection with the recent conversion of over $4,600,000 of the company's 3-year notes into long-term bonds. These items, therefore, have no connection with the operating results in the two years under review and should not be considered in the comparison.

As is known, for the past 5 years the operations of the company have been conducted under the supervision of a creditors' committee, or under restrictions imposed by it. In December, 1912, a refinancing plan was declared effective, under which the notes held by the creditors were converted into the company's long-term bonds, and in connection with this plan Mr. Westinghouse purchased $1,000,000 of the bonds to provide additional working capital required. The refinancing plan having been carried into effect, the management and control of the company have reverted to its stockholders, and the entire board of directors elected at the present meeting is therefore truly representative of the company's shareholders. Mr. Westinghouse has been giving and will continue to give personal attention to the affairs of the company. Under these conditions, with more orders in hand than the shop can execute in the coming six months, and with the elimination of the necessarily restrictive management under control of the creditors, there is every reason to expect more satisfactory operating results than those of the past five years.

Scrap Iron and Steel Classification

Republic Iron & Steel Company's Revised Specifications

The Republic Iron & Steel Company, Youngstown, Ohio, has revised the specifications which govern its purchases of old material. Its new classification is as follows:

Iron Axles.—Iron railroad car axles, M. C. B. sizes, free from locomotive axles or defective or imperfect forgings.

Steel Axles.—Steel railroad car axles, M. C. B. sizes, free from locomotive axles or defective or imperfect forgings.

Iron Rails.—Standard section T rails, original weight 50-lb. per yard or heavier, minimum length 5 ft., free from frogs, guards, switches, turntable and curved rails.

Steel Rails.—Standard sections T rails, suitable for rerolling, original weight 50-lb. per yard or heavier, minimum length 5 ft., free from split heads, frogs, guards, switches, curved and turntable rails.

A—No. 1 Railroad Wrought.—Heavy wrought iron from railroad shops and cars, 6 in. and longer, including iron links and pins.

B—No. 2 Wrought.—Heavy wrought iron and soft steel scrap from railroad shops and cars, 2 in. long, 2 in. wide or wider, and longer, including track bolts, nuts and spikes, iron angle bars and plain splices, free from patent joints, steel angles and splices, steel channel bars and track spikes.

B-X Cut Forge.—Iron and soft steel scrap suitable for piling purposes without further preparation. Material to be ⅜ in. or heavier, 4 in. or narrower and not over 26 in. in length or shorter than 2 in. May include wagon tire if cut into 6-in. lengths or shorter; also horseshoes if cut into 3 pieces. Must be straight and flat; also free from plate, sheet, hoop and washer scrap, punchings and similar material.

C—Shafting.—Iron and soft steel, 1½ in. to 4 in. round and square, 4 ft. and longer, in straight bars.

D—No. 1 Wrought.—Heavy wrought iron and soft steel fagoting scrap, bars ⅝ in. to 4 in. round or square, flats ¼ in. thick and heavier, 4 in. long or longer, including wagon axles, horseshoes and wagon tires, exclusive of other shapes or bent pieces.

E—No. 1 Country Wrought.—Heavy wrought iron and soft steel scrap (the latter not over 0.12 carbon), including buggy tires, horseshoes; all fagoting scrap.

F—No. 1 Mill.—Iron and soft steel bars not less than ⅜ in. round or square, and flats not thinner than No. 12 wire gauge, including heavy railroad sheet; tank in separate sheets and rings, boiler sheet and rings, clean pipes and flues, heavy punchings and clippings and strictly soft steel agricultural implement shapes. All steel must be under 0.12 carbon.

G—No. 2 Mill.—Iron and soft steel hoops and sheets, railroad sheet, cotton tie clippings and ties, skeleton sheet scrap and iron too light for No. 1 mill; scrap shall be free from galvanized, tinned or badly rusted material.

H—No. 1 Busheling.—Iron and soft steel pipes and flues (clean); tank and bands No. 12 and heavier, boiler plate punchings and clippings, and soft steel and iron drop forgings and trimmings; nothing to be over 8 in. long or wide, free from galvanized or tinned stock. All steel must be under 0.12 carbon.

I—No. 2 Busheling.—Cut hoops, sheet, cotton ties and similar light material; nothing to be over 8 in. long or wide; free from dirt, galvanized or tinned material, or other similar inferior scrap.

J-K—Axle Turnings.—Wrought iron and soft steel railroad car axles, turnings and chips. Free from tire turnings.

L—Turnings.—Machine wrought and soft steel, clean and free from borings and drillings, other metals, dirt, lumps and badly tangled material.

M—Drillings.—Wrought or soft steel, clean and free from other metals, dirt and lumps.

N-O—Mixed Borings and Turnings, and Cast Borings.—Clean and free from other metals, dirt and lumps.

P—Pipes and Flues.—Wrought and soft steel. Must be free from dirt or lime and from riveted seams; nothing over 6 in. in diameter.

Q—No. 1 Heavy Melting Steel.—Railroad steel and heavy steel croppings from rails, billets, blooms, structural shapes, plates, bars, rods, channels, angles, plate shearings from steel plates—not needle scrap, steel rolls and other similar material. All charging box size not over 6 ft. in length or 18 in. wide and not lighter than ½ in. thick. Minimum weight 10 lb., maximum 300 lb. No agricultural shapes, boiler tubes, grate bars, cast iron, sheet stock or light stock of any description, or curly or unwieldly pieces will be accepted. All must be clean and free from all dirt and rubbish.

R—Shoveling Steel.—Strictly new and heavy clean stock, such as railroad track scrap, including spikes, bolts, nuts, etc., boiler and bridge punchings and clippings, small crop ends, bolt ends and other similar material. All must be ¼ in. or over in thickness and no light tangled material will be accepted.

S—Bundled Sheet Scrap.—Strictly new side and end clippings and shearings, well bundled, securely wired and not to exceed 125 lb., to be in charging box size. No stamping scrap will be accepted.

United States Coke Production in 1912

Greatest in the History of the Industry—Rapid Increase in By-Product Coke Plants

The coke industry in the United States has now reached in good years the $100,000,000 mark, and moreover there is a steadily growing increase in the proportion of coke made in by-product and retort ovens whereby the valuable by-products of gas, tar, ammonia, etc., are saved to the value of tens of millions of dollars annually.

In 1912 the total production of coke, according to Edward W. Parker of the United States Geological Survey, was 43,916,834 net tons, valued at $111,523,336, an increase of 8,365,345 tons in quantity and of $27,392,487 in value over 1911. In 1912 the production of beehive coke increased 5,164,701 tons, or 18 per cent., while retort coke increased 3,200,644 tons, or 49 per cent. Although larger than in 1911, the output of beehive coke in 1912 did not reach the record figures for 1910, whereas the production of by-product coke in 1912 was by far the largest yet reached in any one year.

The following table shows both the general increase in coke production in the United States and the rapid strides by which the by-product industry is overtaking the beehive production.

Year—Net tons	By-product coke	Beehive coke	Total
1893	12,850	9,464,730	9,477,580
1901	1,179,900	20,615,983	21,795,883
1907	5,607,899	35,171,665	40,779,564
1908	4,201,226	21,832,292	26,033,518
1909	6,254,644	33,060,421	39,315,065
1910	7,138,734	34,570,076	41,708,810
1911	7,847,845	27,703,644	35,551,489
1912	11,048,489	32,868,345	43,916,834

The progress in the construction of retort or by-product ovens as shown by these figures has been the most significant feature of the coke-making industry in the last few years.

The number of retort ovens in operation increased from 4624 in 1911 to 5061 in 1912, a gain of 437, whereas the total number of all ovens decreased from 103,879 to 102,080, indicating that there were 2236 fewer beehive ovens in existence in 1912 than in 1911. There were nearly 1000 more retort ovens under construction at the close of the year, and contracts had been made for the construction of a number of additional plants.

Economies and Advantages of By-Product Ovens

The quantity of coal required to produce a ton of coke is much less than formerly. The average gain in 1912 compared with 10 years ago is probably at least 160 lb. It is doubtful if in the earlier years the actual yield of coal in coke exceeded 60 per cent., whereas in 1912 it was 67 per cent., according to the United States Geological Survey. This gain is largely due to the increase in the production of by-product coke. In Illinois, Indiana, Massachusetts, Michigan, New Jersey, New York, and Wisconsin, where coke is made exclusively in by-product plants, the yield varies from 69.6 per cent. (in Wisconsin) to 81.8 per cent. (in Indiana), whereas in the States where beehive practice prevails the yield in 1912 varied from 50 per cent. (in Georgia) to 66.5 per cent. (in Pennsylvania).

The charging capacity of the original by-product ovens at Syracuse, N. Y., was 4.4 tons of coal and the time required for coking was 24 hours. Even at that time a gain of at least 50 per cent. in coking time was obtained compared with beehive practice, which required 48 hours for the production of furnace coke and 72 hours for the production of foundry coke. The Semet-Solvay ovens of to-day hold at the average about 16 tons of coke. The exact capacity depends, of course, on the specific gravity of the coals used. The original 60 Otto-Hoffmann ovens at Johnstown had a charging capacity of about 5½ tons each. The latest installation of United Otto ovens at Mayville, Wis., in 1912, have an average capacity of 10.33 tons of coal each. The coking time has been materially reduced, so that excellent furnace coke is now made in 16 to 18 hours.

The development of modern mechanical appliances has also done much to forward the efficiency of the retort oven and to reduce the labor necessary per unit of output. The same crew of men who 20 years ago were required to handle 25 of the small ovens and who were carbonizing say 110 tons of coal a day are able with modern equipment to handle 50 or more of the larger ovens, coking 1000 tons of coal a day.

Twenty years ago the only ammonia recovered was in the form of crude liquor running from 12 to 15 per cent. ammonia. Now coking plants are producing ammonia liquor ranging from crude through the different grades required for the manufacture of flameless powder, etc., to the production of almost chemically pure aqua ammonia, at one operation. Still another marked development in by-product oven practice is in the adaptation of the surplus gas to the illumination of cities and towns. To-day the by-product ovens in the United States are selling from 40,000,000 to 50,000,000 cu. ft. of gas a day for illuminating purposes.

Until 1908 the Semet-Solvay and United Otto (Otto-Hoffmann) ovens held the entire field of retort-oven practice. In that year, however, the Illinois Steel Company constructed at Joliet, Ill., 140 Koppers regenerative by-product ovens. This plant was doubled in the following year and a number of other plants of this type have since been constructed in different parts of the country. In 1909 construction was begun on 300 Didier ovens at South Bethlehem, Pa., but they had not been put into blast at the close of 1912. During 1912 a bank of 22 Klönne ovens was completed at Muncie, Ind.

The General Electric Company, Schenectady, N. Y., will furnish the Indiana Steel Company, Gary, Ind., a 500-kw. motor-generator set, a 530-kva. motor-generator set, one multi-stage centrifugal turbine, switchboard, etc.; Northwestern Iron Company, Mayville, Wis., a 400-kw. two-unit, three-bearing motor-generator set and switchboards; Bethlehem Steel Company, South Bethlehem, Pa., three 3125-kva. gas engine generators, a 1500-kw. motor-generator set, and a 525-hp. motor and switchboard; Eastern Steel Company, Pottsville, Pa., two 750-kw. Curtis turbo-generator units and accessories; Pierce, Butler & Pierce Mfg. Company, Eastwood, N. Y., 46 motors ranging from 1 to 150 hp., a 17.5 motor-generator set and switchboard apparatus; Brier Hill Steel Company, Youngstown, Ohio, two 175-hp. induction motors for direct connection with flexible couplings, and 30 and 50-hp. motors.

The Elgin Commercial Club, Elgin, Ill., is working out the details of a plan soon to be put in operation whereby $125,000 is to be made available for loans to manufacturing enterprises locating and operating in that city. According to the plan, the money will be secured from the local banks on indorsement by the business men of the city.

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	1912-13	1911-12
Shipments billed	$3,840,972.97	$3,440,790.44
Net manufacturing profit after deducting allowances for depreciation	$439,669.26	$164,011.77
Dividends received and other income	123,577.93	123,149.33
Total	$563,247.19	$287,161.10
Less deductions from income	63,217.07	106,286.88
Net earnings applicable to interest, dividends or capital accounts	$500,030.12	$180,874.22
Interest charges	418,338.95	478,933.73
Net earnings after payment of interest charges	$81,691.17	$298,059.51
Less charges to surplus	42,729.27	5,772,928.68
Net addition to surplus	$38,961.90	$6,070,988.19

The charges against surplus account shown above in the year ended March 31, 1912, amounting to approximately $5,800,000, principally represent adjustments in book values of certain investments acquired many years previously; and the same item in the year ended March 31, 1913, amounting to approximately $43,000, consists in the main of charges in connection with the recent conversion of over $4,600,000 of the company's 3-year notes into long-term bonds. These items, therefore, have no connection with the operating results in the two years under review and should not be considered in the comparison.

As is known, for the past 5 years the operations of the company have been conducted under the supervision of a creditors' committee, or under restrictions imposed by it. In December, 1912, a refinancing plan was declared effective, under which the notes held by the creditors were converted into the company's long-term bonds, and in connection with this plan Mr. Westinghouse purchased $1,000,000 of the bonds to provide additional working capital required. The refinancing plan having been carried into effect, the management and control of the company have reverted to its stockholders, and the entire board of directors elected at the present meeting is therefore truly representative of the company's shareholders. Mr. Westinghouse has been giving and will continue to give personal attention to the affairs of the company. Under these conditions, with more orders in hand than the shop can execute in the coming six months, and with the elimination of the necessarily restrictive management under control of the creditors, there is every reason to expect more satisfactory operating results than those of the past five years.

Scrap Iron and Steel Classification

Republic Iron & Steel Company's Revised Specifications

The Republic Iron & Steel Company, Youngstown, Ohio, has revised the specifications which govern its purchases of old material. Its new classification is as follows:

Iron Axles.—Iron railroad car axles, M. C. B. sizes, free from locomotive axles or defective or imperfect forgings.

Steel Axles.—Steel railroad car axles, M. C. B. sizes, free from locomotive axles or defective or imperfect forgings.

Iron Rails.—Standard section T rails, original weight 50-lb. per yard or heavier, minimum length 5 ft., free from frogs, guards, switches, turntable and curved rails.

Steel Rails.—Standard sections T rails, suitable for rerolling, original weight 50-lb. per yard or heavier, minimum length 5 ft., free from split heads, frogs, guards, switches, curved and turntable rails.

A—No. 1 Railroad Wrought.—Heavy wrought iron from railroad shops and cars, 6 in. and longer, including iron links and pins.

B—No. 2 Wrought.—Heavy wrought iron and soft steel scrap from railroad shops and cars, 2 in. long, 2 in. wide or wider, and longer, including track bolts, nuts and spikes, iron angle bars and plain splices, free from patent joints, steel angles and splices, steel channel bars and track spikes.

B-X Cut Forge.—Iron and soft steel scrap suitable for piling purposes without further preparation. Material to be ⅜ in. or heavier, 4 in. or narrower and not over 26 in. in length or shorter than 2 in. May include wagon tire if cut into 6-in. lengths or shorter; also horseshoes if cut into 3 pieces. Must be straight and flat; also free from plate, sheet, hoop and washer scrap, punchings and similar material.

C—Shafting.—Iron and soft steel, 1½ in. to 4 in. round and square, 4 ft. and longer, in straight bars.

D—No. 1 Wrought.—Heavy wrought iron and soft steel fagoting scrap, bars ⅝ in. to 4 in. round or square, flats ¼ in. thick and heavier, 4 in. long or longer, including wagon axles, horseshoes and wagon tires, exclusive of other shapes or bent pieces.

E—No. 1 Country Wrought.—Heavy wrought iron and soft steel scrap (the latter not over 0.12 carbon), including buggy tires, horseshoes; all fagoting scrap.

F—No. 1 Mill.—Iron and soft steel bars not less than ⅜ in. round or square, and flats not thinner than No. 12 wire gauge, including heavy railroad sheet; tank in separate sheets and rings, boiler sheet and rings, clean pipes and flues, heavy punchings and clippings and strictly soft steel agricultural implement shapes. All steel must be under 0.12 carbon.

G—No. 2 Mill.—Iron and soft steel hoops and sheets, railroad sheet, cotton tie clippings and ties, skeleton sheet scrap and iron too light for No. 1 mill; scrap shall be free from galvanized, tinned or badly rusted material.

H—No. 1 Busheling.—Iron and soft steel pipes and flues (clean); tank and bands No. 12 and heavier, boiler plate punchings and clippings, and soft steel and iron drop forgings and trimmings; nothing to be over 8 in. long or wide, free from galvanized or tinned stock. All steel must be under 0.12 carbon.

I—No. 2 Busheling.—Cut hoops, sheet, cotton ties and similar light material; nothing to be over 8 in. long or wide; free from dirt, galvanized or tinned material, or other similar inferior scrap.

J-K—Axle Turnings.—Wrought iron and soft steel railroad car axles, turnings and chips. Free from tire turnings.

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L—Turnings.—Machine wrought and soft steel, clean and free from borings and drillings, other metals, dirt, lumps and badly tangled material.

M—Drillings.—Wrought or soft steel, clean and free from other metals, dirt and lumps.

N-O—Mixed Borings and Turnings, and Cast Borings.—Clean and free from other metals, dirt and lumps.

P—Pipes and Flues.—Wrought and soft steel. Must be free from dirt or lime and from riveted seams; nothing over 6 in. in diameter.

Q—No. 1 Heavy Melting Steel.—Railroad steel and heavy steel croppings from rails, billets, blooms, structural shapes, plates, bars, rods, channels, angles, plate shearings from steel plates—not needle scrap, steel rolls and other similar material. All charging box size not over 6 ft. in length or 18 in. wide and not lighter than ½ in. thick. Minimum weight 10 lb., maximum 300 lb. No agricultural shapes, boiler tubes, grate bars, cast iron, sheet stock or light stock of any description, or curly or unwieldly pieces will be accepted. All must be clean and free from all dirt and rubbish.

R—Shoveling Steel.—Strictly new and heavy clean stock, such as railroad track scrap, including spikes, bolts, nuts, etc., boiler and bridge punchings and clippings, small crop ends, bolt ends and other similar material. All must be ¼ in. or over in thickness and no light tangled material will be accepted.

S—Bundled Sheet Scrap.—Strictly new side and end clippings and shearings, well bundled, securely wired and not to exceed 125 lb., to be in charging box size. No stamping scrap will be accepted.

United States Coke Production in 1912

Greatest in the History of the Industry—Rapid Increase in By-Product Coke Plants

The coke industry in the United States has now reached in good years the $100,000,000 mark, and moreover there is a steadily growing increase in the proportion of coke made in by-product and retort ovens whereby the valuable by-products of gas, tar, ammonia, etc., are saved to the value of tens of millions of dollars annually.

In 1912 the total production of coke, according to Edward W. Parker of the United States Geological Survey, was 43,916,834 net tons, valued at $111,523,336, an increase of 8,365,345 tons in quantity and of $27,392,487 in value over 1911. In 1912 the production of beehive coke increased 5,164,701 tons, or 18 per cent., while retort coke increased 3,200,644 tons, or 49 per cent. Although larger than in 1911, the output of beehive coke in 1912 did not reach the record figures for 1910, whereas the production of by-product coke in 1912 was by far the largest yet reached in any one year.

The following table shows both the general increase in coke production in the United States and the rapid strides by which the by-product industry is overtaking the beehive production.

Year—Net tons	By-product coke	Beehive coke	Total
1893	12,850	9,464,730	9,477,580
1901	1,179,900	20,615,983	21,795,883
1907	5,607,899	35,171,665	40,779,564
1908	4,201,226	21,832,292	26,033,518
1909	6,254,644	33,060,421	39,315,065
1910	7,138,734	34,570,076	41,708,810
1911	7,847,845	27,703,644	35,551,489
1912	11,048,489	32,868,345	43,916,834

The progress in the construction of retort or by-product ovens as shown by these figures has been the most significant feature of the coke-making industry in the last few years.

The number of retort ovens in operation increased from 4624 in 1911 to 5061 in 1912, a gain of 437, whereas the total number of all ovens decreased from 103,879 to 102,080, indicating that there were 2236 fewer beehive ovens in existence in 1912 than in 1911. There were nearly 1000 more retort ovens under construction at the close of the year, and contracts had been made for the construction of a number of additional plants.

Economies and Advantages of By-Product Ovens

The quantity of coal required to produce a ton of coke is much less than formerly. The average gain in 1912 compared with 10 years ago is probably at least 160 lb. It is doubtful if in the earlier years the actual yield of coal in coke exceeded 60 per cent., whereas in 1912 it was 67 per cent., according to the United States Geological Survey. This gain is largely due to the increase in the production of by-product coke. In Illinois, Indiana, Massachusetts, Michigan, New Jersey, New York, and Wisconsin, where coke is made exclusively in by-product plants, the yield varies from 69.6 per cent. (in Wisconsin) to 81.8 per cent. (in Indiana), whereas in the States where beehive practice prevails the yield in 1912 varied from 50 per cent. (in Georgia) to 66.5 per cent. (in Pennsylvania).

The charging capacity of the original by-product ovens at Syracuse, N. Y., was 4.4 tons of coal and the time required for coking was 24 hours. Even at that time a gain of at least 50 per cent. in coking time was obtained compared with beehive practice, which required 48 hours for the production of furnace coke and 72 hours for the production of foundry coke. The Semet-Solvay ovens of to-day hold at the average about 16 tons of coke. The exact capacity depends, of course, on the specific gravity of the coals used. The original 69 Otto-Hoffmann ovens at Johnstown had a charging capacity of about 5½ tons each. The latest installation of United Otto ovens at Mayville, Wis., in 1912, have an average capacity of 10.33 tons of coal each. The coking time has been materially reduced, so that excellent furnace coke is now made in 16 to 18 hours.

The development of modern mechanical appliances has also done much to forward the efficiency of the retort oven and to reduce the labor necessary per unit of output. The same crew of men who 20 years ago were required to handle 25 of the small ovens and who were carbonizing say 110 tons of coal a day are able with modern equipment to handle 50 or more of the larger ovens, coking 1000 tons of coal a day.

Twenty years ago the only ammonia recovered was in the form of crude liquor running from 12 to 15 per cent. ammonia. Now coking plants are producing ammonia liquor ranging from crude through the different grades required for the manufacture of flameless powder, etc., to the production of almost chemically pure aqua ammonia, at one operation. Still another marked development in by-product oven practice is in the adaptation of the surplus gas to the illumination of cities and towns. To-day the by-product ovens in the United States are selling from 40,000,000 to 50,000,000 cu. ft. of gas a day for illuminating purposes.

Until 1908 the Semet-Solvay and United Otto (Otto-Hoffmann) ovens held the entire field of retort-oven practice. In that year, however, the Illinois Steel Company constructed at Joliet, Ill., 140 Koppers regenerative by-product ovens. This plant was doubled in the following year and a number of other plants of this type have since been constructed in different parts of the country. In 1909 construction was begun on 300 Didier ovens at South Bethlehem, Pa., but they had not been put into blast at the close of 1912. During 1912 a bank of 22 Klönne ovens was completed at Muncie, Ind.

The General Electric Company, Schenectady, N. Y., will furnish the Indiana Steel Company, Gary, Ind., a 500-kw. motor-generator set, a 530-kva. motor-generator set, one multi-stage centrifugal turbine, switchboard, etc.; Northwestern Iron Company, Mayville, Wis., a 400-kw. two-unit, three-bearing motor-generator set and switchboards; Bethlehem Steel Company, South Bethlehem, Pa., three 3125-kva. gas engine generators, a 1500-kw. motor-generator set, and a 525-hp. motor and switchboard; Eastern Steel Company, Pottsville, Pa., two 750-kw. Curtis turbo-generator units and accessories; Pierce, Butler & Pierce Mfg. Company, Eastwood, N. Y., 46 motors ranging from 1 to 150 hp., a 17.5 motor-generator set and switchboard apparatus; Brier Hill Steel Company, Youngstown, Ohio, two 175-hp. induction motors for direct connection with flexible couplings, and 30 and 50-hp. motors.

The Elgin Commercial Club, Elgin, Ill., is working out the details of a plan soon to be put in operation whereby $125,000 is to be made available for loans to manufacturing enterprises locating and operating in that city. According to the plan, the money will be secured from the local banks on indorsement by the business men of the city.

Revision of the Specifications for Steel

Important Work of Committee A-1 of the American Society for Testing Materials—Late Investigations in Steel and Non-Ferrous Metals

Following a year in which the efforts of its leaders were so largely concentrated on the Congress of the International Association for Testing Materials, held in New York in September, 1912, it might have been expected that the sixteenth annual meeting of the American Society for Testing Materials at Atlantic City last week would show signs of lagging activity. On the contrary, a new high point in attendance was reached at 365 and the 61 papers and committee reports gave evidence of an unusual amount of hard work, particularly by committees, the result being the submission to letter ballot of a record number of new and revised specifications. A remarkable performance was that of Committee A-1 on Standard Specifications for Steel, which submitted 14 revised and 9 entirely new specifications.

In contrast with some of the earlier meetings of the society that of last week developed little of the militant so far as iron and steel specifications are concerned. The old-time clashes over rail steel have not been revived, the trying out of the issues on rail specifications having been delegated to others for the time being. When the steel manufacturers and the railroad officials have gone farther with their inquiries the Society for Testing Materials will take up the question again.

This year's meeting was marked by the printing in advance of 700 pages of reports and papers—a departure commended on all hands. The very early appearance of the complete proceedings, including discussions, is thus assured.

The morning session of Wednesday, June 25, was almost entirely taken up with the report of Committee A-1, on standard specifications for steel. However, previous to this report, a very interesting and important paper was presented by Prof. W. K. Hatt on "Tests Made on Reinforcing Bars Re-rolled from Steel Rails." It covered work done at the testing laboratory of Purdue University from September, 1912, to February, 1913, on 2036 samples of bars re-rolled from old steel rails. On these samples 1719 tension tests and 1264 bend tests were made, involving an immense amount of detail. A careful reading of the report is really necessary to gain an adequate idea of the work done, since it contains many plotted curves and tables. In general the results showed that re-rolled steel has an excess ductility for its strength above usual grades of steel and that the twisted bars yield, as a rule, a smaller product of strength and elongation than the plain or deformed. In comparing material from the head, web and flange, from each of which parts various sized and shaped bars were rolled, the web bars were found to be harder than those from the head and the flange bars softer than the head bars. The general tendency of each group is toward decrease of strength and increase of elongation as the size of bars increases. A comparison of the design of bar showed that the plain round bars were the strongest and the twisted bars the weakest. An investigation was also made to determine the relation between re-rolled bars and the original rail, and for this purpose new rails of known and uniform composition were used. The results showed that the process of re-rolling has raised the mechanical quality of the material and has brought nearer together the divergent material from the head and the flange.

Practice at Rail Re-rolling Mills

The paper contained this interesting statement concerning mill practice:

The raw material used in the industry consists mainly of old rails which have been removed from service, although new rails known as seconds are used to some extent. These seconds are rails which have been rejected on account of some surface physical defects. Defects in a rail which might interfere with the rolling, such as split heads, burrs or cracks, are carefully removed before the rail is permitted to enter the furnace. The old rails are, of course, mainly Bessemer.

The rails used are usually broken into lengths of 10 to 15 feet before heating, although at least one mill is equipped to roll rails in their full length of 33 feet. The sizes and lengths of rails used depends in a great measure on the sizes of bars to be rolled. To roll bars of large cross-section and of considerable length requires a rail with a large head which is but slightly worn. When it is desired to roll a small bar from the web a shorter rail must be used, as otherwise the resulting bar would not only be inconvenient to handle, but too long for the hot beds.

The furnaces are equipped to hold from 45 to 65 rails, side by side in a horizontal position. The rails are fed to the furnace by a conveyor, and enter sidewise in some plants, and endwise in others. The rate of progress of the rail through the furnace is dependent on the speed of rolling. The distance from the coolest to the hottest portion of the furnace is such that the rail is heated slowly and uniformly. The average rate of rolling of ordinary bars is from three-quarters to one and one-quarter minutes each. Assuming a capacity of furnace of 60 rails, the time in the furnace would be from 45 to 75 minutes, as the case may be. The fuel used is coal, producer gas, or oil, and since all furnaces are equipped with forced draft the temperature is easily and uniformly regulated.

The rolling is very similar to that of any bar or small-shape mill, except in one particular. The head, web and flange must be rolled separately; consequently the first or first two passes must strip these elements from each other. The different parts are then rolled into the desired sizes and shapes, as in an ordinary mill.

Although reinforcing steel is rolled from all three parts of the rail, most of it comes from the head. The web and flange furnish the small shapes such as flats, channels, angles and tees. These are furnished very extensively to the furniture and agricultural implement industry. The latter industry also receives the major portion of harrow teeth and other small parts from plain bars of rerolled rail steel. One company is making built-up high-tension electric transmission-line poles from U-bars and flats of re-rolled rail steel.

Professor Hatt's paper was enthusiastically received and he was given a vote of thanks.

Revised Steel Specifications

The report of Committee A-1, on standard specifications for steel, was presented by A. A. Stevenson for the retiring chairman, William R. Webster. The last year has been a very busy one, the membership of the committee having been increased from 70 to 93 and four additional sub-committees having been appointed—on spring steel, on methods of chemical analysis, on methods of tests, and on literary form. The importance of the committee has required a membership that could be relied upon, and many well-attended meetings have been held. The recommendations of the committee embraced the revision of 14 specifications in certain details and the adoption of 9 new standard specifications. The specifications to be revised cover those for steel splice bars; structural steel for bridges; structural nickel steel, structural steel for buildings; steel reinforcing bars; steel axles, steel tires, steel castings; lap welded and seamless steel boiler tubes and safe ends 2½ in. in diameter and under; automobile carbon and alloy steels; boiler and fire box steel; boiler rivet steel; annealed steel forgings; steel shapes, universal mill plates, and bars.

New Steel Specifications

The new proposed standard specifications recommended by the committee embraced the following: Medium carbon steel splice bars; high carbon steel splice bars; extra high carbon steel splice bars; structural steel for ships; rivet steel for ships; rail steel concrete reinforcement bars; cold-rolled steel axles; wrought solid carbon steel wheels for electric railway service; blooms, billets and slabs for carbon steel forgings. Of the above nine proposed speci-

fications, those for rail-steel concrete reinforcement bars and for blooms, billets and slabs for carbon steel forgings are printed elsewhere in this issue.

The committee's report, with appendices, takes up 79 printed pages. Only brief references can be made here to some of the committee's comments. On the subject of rails it was stated that conditions during the past year rendered it inexpedient to report revisions at this meeting, but it was hoped that next year revised specifications could be reported for both Bessemer and open-hearth rails.

Splice Bars

In recommending three new splice bar specifications the committee brings the number of specifications for that product up to four. It recommends that the title of the present specification be changed from "Steel Splice Bars" to "Low Carbon Steel Splice Bars." The requirement as to chemical composition is changed so as to make the phosphorus in Bessemer steel not over 0.10 per cent. and in open-hearth steel not over 0.05 per cent. The three new specifications are for medium carbon steel, high carbon steel and extra-high carbon steel splice bars respectively. In the first of these, carbon is to be not under 0.30 per cent. and phosphorus not over 0.04 per cent. In the second, carbon is to be not under 0.45 per cent. and phosphorus not over 0.04 per cent. In the third, phosphorus is to be not over 0.04 per cent. Tensile strength in the first named is to be 68,000 to 83,000 lb. per sq. in. and the elongation in 2 in. not less than 1,600,000 divided by tensile strength. In the second (high carbon) the tensile strength is to be 85,000 lb. per sq. in. and the elongation 14 per cent. in 2 in. In the third, tensile strength is to be 100,000 lb. per sq. in. and elongation 10 per cent. in 2 in.

Structural Steel for Ships

The present specifications for structural steel for ships are to be cancelled, and the committee recommends that they be substituted by two—namely, proposed new specifications for structural steel for ships and proposed new specifications for rivet steel for ships.

In the specifications covering structural steel for bridges the committee recommended that for the yield point a minimum value of one-half the ultimate tensile strength be required.

Steel Forgings, Axles and Castings

Several meetings have been held in the year to discuss changes in the specifications for steel forgings, but unanimous agreement could not be reached and the work will be continued in the coming year with a view to a definite report at the next annual meeting.

The specifications for steel axles have been revised to make them applicable to carbon steel car and tender axles, subject only to drop test requirements. The committee intended to make provision for carbon steel driving axles subject to tension tests and not to drop tests, in connection with proposed new specifications for carbon steel forgings, but as indicated above, this matter goes over for another year.

The specifications for steel castings have been revised and extended with a view of making specific provision for castings intended for use in ship construction and in railroad rolling stock construction. In the specifications covering structural steel for bridges the committee proposed that the requirements for castings be omitted and in their stead a paragraph be inserted providing that the society's specifications for steel castings shall govern the purchase of steel castings for bridges.

Among the changes in the steel castings specifications is a provision that phosphorus in Class A castings ("ordinary castings for which no physical requirements are specified") shall not be over 0.06 per cent. Heretofore the maximum has been 0.08 per cent.

Wrought Steel Wheels

In connection with the investigation of wrought steel wheels sub-committee 7 had held seven meetings. Consideration was given to four questions: Mating and grouping, analysis, thermal tests, and drop tests. The Pennsylvania Railroad Company at its Juniata shops tested eight wheels, two from each of the four manufacturers. Details of these tests were given. The committee is unable to make final recommendation on the above four points under consideration, but reports progress as follows: Large numbers of wheels have been mated and grouped by carbon and put into service by different consumers. Until the results of these trials are obtained the committee can make no recommendations. The same condition exists as to the matter of analysis. As to the thermal test, the committee finds that its effect on rolled steel wheels is imperceptible and its incorporation in a specification is not recommended. As to the drop test, information thus far obtained does not seem to warrant recommending any test to be applied to groups or individual wheels, and the committee reports progress.

Discussion

In the discussion on the voluminous report of Committee A-1 some objections were made to sending certain proposed specifications to letter ballot, but it was urged on behalf of the committee that some of the objections now made come from persons on sub-committees who had not been heard from when the work was under way. It was argued that the objects sought could best be secured by adopting what had been prepared after such long and arduous labors, leaving any changes that are found desirable to be made subjects of amendment in the coming year.

One of the participants in the discussion was a representative of the American Electric Railway Engineering Association, who asked that action on the specifications for wrought carbon steel wheels be postponed one year, until his association had more nearly perfected its proposed specifications, but he was voted down.

L. D. Rights, of L. F. Shoemaker & Co., and others called attention to the importance of the yield point in structural steel, and the committee was authorized to bring in a report next year on the proper yield point requirement in the structural steel specifications.

The new proposed specifications for blooms, billets and slabs for carbon steel forgings received considerable attention, some members, including S. V. Hunnings, American Locomotive Company, and G. H. Woodroffe, Baldwin Locomotive Works, urging that they do not sufficiently safeguard the interests of consumers. A tensile test was called for, also a paragraph covering segregation. Robert Job said that porosity and piping, which cannot be detected in a bloom or billet as received by the manufacturer, cause the largest number of failures in forgings. A communication was read from a manufacturer who said that a stringent specification for forging steel was particularly needed at this time in view of the prospective importation of billets on the Atlantic Coast under the revised tariff. In reply to the call for a segregation provision the chairman of the sub-committee said that it was impossible at this time to agree on such a paragraph in view of the diverse views of the manufacturers of forgings on this subject. In the coming year, however, the sub-committee will endeavor to formulate paragraphs relating to segregation and tensile test.

All the proposed changes in existing steel specifications and all the proposed new specifications were finally adopted and ordered sent to letter ballot.

New Organization of the Steel Committee

In connection with the presentation of the report of Committee A-1 a noteworthy change in its organization was announced. More has been heard in the past 15 years of this premier committee of the society than of any other, as it had to do with specifications for steel, and the number of these, including those proposed at this year's meeting, is no less than 31. From the beginning, William R. Webster, consulting engineer, Philadelphia, has been chairman of the commitee. At the outset it had but six members. Today it has 93 members, assigned to 16 sub-committees. The society membership meanwhile has increased from 70 to 1574, or more than 20-fold, and iron and steel manufacturers and consumers are the largest interests represented. Last week Mr. Webster tendered his resignation as chairman, in pursuance of a purpose he has long entertained. His labors and those of a number of his associates have been abundant and have done much toward the adjustment of questions long at issue, particularly in rails. C. D. Young, engineer of tests, Pennsylvania Railroad, Altoona, Pa., who has been second vice-chairman of the

(Continued on page 49)

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Heavy Production of By-Product Coke

There is a distinct probability that the country's entire increase in coke requirements due to increased pig iron make will now be supplied by by-product ovens. This has probably been true also since 1907. Statistics of coke production in 1912, just supplied by the United States Geological Survey, show that last year's output of beehive coke was less than in 1909 or 1910, which years stood second and third to the 1907 output, which was record. Despite an increase of 15 per cent. in pig iron output from 1907 to 1912, there was a decrease in beehive coke production of 6 per cent., the increased coke demand being supplied by an increase in by-product coke.

Through very rapid percentage gains in recent years, the output of by-product coke has now reached important proportions, being in 1912 no less than 25.2 per cent. of the total coke reported, the Geological Survey reports taking no account of gas house coke, but including all other coke, whether used as metallurgical fuel or not. This proportion of 25.2 per cent. by-product coke in 1912 compares with 13.8 per cent. in 1907, 5.5 per cent. in 1902 and 2 per cent. in 1897. Thus the proportion has more than quadrupled in a decade, while the percentage gain in tonnage has been 459 per cent., from 1,403,588 net tons of by-product coke in 1902 to 11,048,489 tons in 1912.

The output of beehive coke in 1912 was 32,768,345 tons, making the year's total coke output 43,916,834 tons. This was in a year in which 29,726,937 tons of pig iron was produced, showing 1.48 net tons of coke produced to one gross ton of pig iron. Inasmuch as very little pig iron is produced with anthracite or charcoal as fuel, and it requires from 1.1 to 1.3 net tons of coke to produce one ton of pig iron in the blast furnace, while there is about 6,000,000 tons of pig iron melted in the cupola, it will be seen that only a relatively small proportion of the coke reported has been used elsewhere than in the iron and steel industry. The closest computation would show a consumption of not less than 35,000,000 tons of coke last year in the blast furnace and the cupola, including cupola-melted pig iron in steel works as well as iron foundry operations, leaving a balance of not over 9,000,000 tons of coke, and probably considerably less, used in all other ways.

The following table, covering selected years, shows the output of beehive and by-product coke, in net tons:

Coke Production in the United States, 1897-1912

	Beehive	By-product	Total
1897	13,027,072	261,912	13,288,984
1902	24,998,142	1,403,588	25,401,730
1907	35,171,665	5,607,899	40,779,564
1908	21,832,292	4,201,226	26,033,518
1909	33,060,421	6,254,644	39,315,065
1910	34,570,076	7,138,734	41,708,810
1911	27,703,644	7,847,845	35,551,489
1912	32,868,345	11,048,489	43,916,834

The record output of beehive coke was made in 1907. The much larger pig iron production in 1910 did not bring out a larger beehive coke production, and the further gain in pig iron output in 1912 was attended by a further decrease in the production of this description of coke. Already this year there has been a considerable increase in by-product operations, and another and wholly new plant is to start in the very near future, while another large one will probably be completed next year. The trend at the moment is clearly in the direction of by-product coke manufacture increasing more rapidly than the demand increases by

way of increased pig iron output, leaving it fairly certain that the history of the coke industry will see a continued decrease in beehive coke production.

In these circumstances it is interesting to note the peculiar position occupied by the Connellsville coke industry, as represented by production statistics published annually by the Connellsville Courier. According to these statistics the Connellsville region shipped 20,000,000 tons in 1906 and 19,000,000 tons in 1907, although the Geological Survey's figures show an increase in the total beehive coke output of the country of 3,300,000 tons from 1906 to 1907. For 1912 the Courier again reported 20,000,000 tons of Connellsville coke shipped, whereas the total beehive output of the country showed a decrease as compared with 1907. From year to year there have been rather wide variations, apparently, in the proportion of Connellsville coke to total beehive coke made in the country. In the six years 1898 to 1903 inclusive the proportion averaged between 55 and 60 per cent., while in 1912 the proportion seems to have been about 61 per cent. While many of the oldest operations in the original Connellsville region or "old basin" have been worked out, and others are nearing their end, what is called the Connellsville region is being constantly extended by the opening up of new territory to which the name is attached.

The Time Clock and the Time Card

Theoretically, the time clock and the time card of the workman afford a perfect record of the labor cost of a job and insure that all working hours may be reckoned in actual results. In practice, however, it has been demonstrated that the personal equation will continue to exist; that the cost system based upon the supposition that no idle time is unaccounted for while men are at their employment is a fallacy. The foreman and his time clerk have it in their power to produce a condition which will upset the attempt at any exact record of labor expense.

Under most cost systems the employee is supposed to punch in his card with the hour and minute when he completes a job, and to make similar entry the next moment of the beginning of the succeeding job. That is to say, if job 17 is completed at 4 p. m., August 5, job 18 shows on the ticket as beginning at 4 p. m. This is as it should be, providing the foreman plans the work of his department so skillfully that there is no delay between the completion of one task and the taking up of that which succeeds it. However, foremen are not always forehanded; some men are so constituted that they cannot be, unless they are kept under the strictest supervision. When a man reports that he is ready for another job it may be that no work has been laid out for him. If he is to receive full wages his time card must account for all the hours he is in the shop. In the case in question, the foreman very likely tells him to wait about for a few minutes and not to punch out the finished job until a new one is assigned him; or, the old job may be punched out, and the new one punched in half an hour or so before he begins the work. It is not his fault; it is the foreman's. The cost records include the wasted time as devoted to production, in that it is apportioned to some job. But the waste exists, nevertheless. The man has been idle.

The time clerk may be an important factor in this connection. He should follow the progress of all jobs in a general way, so that he may nudge the foreman in time to have all arrangements for future work made. An expert who has carried on an investigation at a large plant of losses incurred in this manner found that the resultant number of idle hours totaled no inconsiderable figure.

Compensation Acts and the Doctors

The Industrial Accident Board of Massachusetts, which has in charge the matter of payments under the workmen's compensation act, is attempting to adjust difficulties which have arisen in the operation of the law as to the remuneration of doctors and surgeons for services rendered in connection with industrial accidents. The question is considered one of much importance to owners. Under the act they must pay surgeons' and hospital fees for the 14 days following an accident. After that period they begin to pay compensation based upon the previous earnings of the injured person, but cease to pay for care. In something over 85 per cent. of the accidents the workman was incapacitated for less than the 14 days. In fact, the average cost to the employer is, and probably will be, less for actual compensation than for the surgical and hospital treatment in the initial fortnight.

Physicians and hospitals are naturally quite unwilling to consider this class of patients as eligible to the charity list. The insurance companies agree that this stand is wholly a just one. But a certain class of physicians are abusing the privilege by making exorbitant charges, padding bills by too frequent visits and treatments, and by the maximum individual fee permitted by law.

"The Industrial Accident Board recently invited a number of representative physicians to meet with the members in conference. The result was a frank discussion of these conditions and the appointment of a strong committee of physicians, headed by Dr. Frederick J. Cotton, a prominent Boston practitioner, which proposes to investigate the whole subject with the idea of establishing some standard practice.

The Massachusetts law provides that during the first two weeks after an injury the liability insurance company—either the one established by the State or one of the private companies—has the right to elect by what doctor and at what hospital the patient shall be treated. The Industrial Accident Board has let down the bars; in co-operation with the private companies and against their better judgment, apparently, the injured man is now permitted to select his own physician. The result in many cases has been such as to demand action. Where the insurance people protest against bills they consider exorbitant the Industrial Accident Board passes judgment. Fees are limited to $5 a visit. The aim has been to have injured men and women seek their family physicians, who would charge the same fee as if the cases were wholly in private practice. To quote from Chairman Carroll's statement to the physicians who sat in the conference:

> Some bills that have been refused payment by insurance companies have been fair, but others are exactly the contrary. When a young doctor, living and seeking practice in a neighborhood of working poor, asks $5 a visit, sometimes making two visits a day, the answer is obvious. When doctors visit patients with a crush of the nerve of a thumb, or a lacerated wound, and claim they make three

visits a day because of the necessity of administering opiates, what is the answer? These, however, are only the common, everyday troubles of the medical features of the Workmen's Compensation Act.

Many hospitals throughout the Commonwealth have jumped their rates owing to the act, and to-day discriminate against the employer insured under the act and in favor of the man who does not insure. The man who insures under the act finds out that the hospital is charging him $14, and his next-door neighbor, not insured, is paying to that hospital but $7 a week. We have had cases where good hospitals charge $10.50 for service. Are we going to approve a bill for one hospital for $10 and another for $21, both performing the same service?

A man is brought into a hospital and is attended by a man on the staff of that hospital. Should the doctor on the staff of that hospital receive compensation during the two weeks the man is in the hospital? In many cases it is done. It all comes back to the question of cost. If the cost of the doctors and the hospitals is too much, the insurance companies will hire their own doctors and build their own hospitals. In fact, one insurance company is building its own hospital, and we are probably going to have more of such hospitals.

Speaking for the physicians, Dr. Cotton said:

There has been a certain amount of feeling that the charitable habits of the doctors and the institutions were being exploited, as it were, for the benefit of the insurance companies, in the case of those individuals who were insured. It has been a question of irritation. I know the situation fairly well, and I think I am safe in saying that the doctors' attitude has been mainly a result of apparent unfairness. In some communities the doctor's income has been seriously cut into, but of the many here to-day few have any serious pocketbook grievance. We want to see things straightened out. The general feeling among physicians seems to be that hospitals should be paid at least cost for care of cases under the act. The physicians themselves, in almost all hospitals, are not compensated at all. There is no reason why ordinary charity hospitals should be expected to take care of these injured employees. The hospital, however, usually feels itself under a moral obligation to see these cases through, once they are cared for as accident cases.

The latter statement of Dr. Cotton raises a point which has been given much prominence in medical circles. If a man is seriously hurt in his employment, necessitating a stay of more than two weeks in a hospital, the employer, through an insurance company, pays the bill for two weeks, after which only the patient himself can be looked to legally for the fee, unless he is a legal resident of the community, in which case the city or town itself may be charged with the bill. In a great number of instances the hospital receives nothing.

The Industrial Loan Companies

The industrial loan companies which have been established in various cities of the country, operating under what is known as the Morris plan, promise to do a good work in providing for worthy applicants the opportunity to borrow money that may be required to tide them over periods of unusual financial need. The usurers who have fastened themselves upon every community have to be met in some manner, if this class of borrower is to be protected against serious hardship.

The earlier attempts in this direction accepted chattel mortgages on personal property, such as home furniture and required a not extortionate rate of interest. The latest comer in the field loans money at 6 per cent on the personal note of the borrower, the security being two indorsers. It is the same kind of accommodation that a national bank affords its customers. There are many honest persons whose credit is good to a certain amount who cannot under any circumstances secure a loan from the bank. The mere fact that they can get indorsers is a voucher that they will meet their obligations. Such movements are of importance in industry. The usurer is a disturbing element. A large percentage of his victims are employees in manufacturing establishments, where the usual rule is against the assignment of wages as security for a loan. A good workman loses much of his efficiency if he is worrying about a harassing debt.

The American Iron and Steel Institute

The general committee on arrangements for the fifth general meeting of the American Iron and Steel Institute, to be held in Chicago in October, 1913, is constituted as follows: James A. Farrell, E. A. S. Clarke, Charles M. Schwab, John A. Topping and Frank S. Witherbee.

The local committee on arrangements for that meeting is as follows: Eugene J. Buffington, chairman; Eugene B. Clark, L. E. Block, Robert P. Lamont, Cyrus H. McCormick and Herbert F. Perkins.

The following new members have recently been elected:

Abell, Oliver J., Western editor, *The Iron Age*, Chicago.

Allaway, Thomas W., Pittsburgh, Pa.

Biggert, Florence C., mechanical engineer, Pittsburgh, Pa.

Browne, deCourcey B., metallurgical engineer, New York City.

Bryen, Thomas T., mechanical engineer, Mesta Machine Company, Pittsburgh, Pa.

Cordes, Frank, department manager, United Engineering & Foundry Company, Pittsburgh, Pa.

Ellis, Frank L., mechanical engineer, United Engineering & Foundry Company, Pittsburgh, Pa.

Finley, James B., president Colonial Steel Company, Pittsburgh, Pa.

Frank, Isaac W., president United Engineering & Foundry Company, Pittsburgh, Pa.

Flannery, James J., president American Vanadium Company, Pittsburgh, Pa.

Gathmann, Emil, mechanical engineer, Baltimore, Md.

Gardner, K. C., United Engineering & Foundry Company, Pittsburgh, Pa.

Gardner, Wm., salesman, United Engineering & Foundry Company, Pittsburgh, Pa.

Heedy, Henry Glen, assistant secretary and treasurer, Andrews & Hitchcock Iron Company, Youngstown, Ohio.

Hubbard, Paul H., assistant manager of sales, Brier Hill Steel Company, Youngstown, Ohio.

Huntley, F. P., vice-president Gould Coupler Company, New York City.

Illingworth, Robert, Crucible Steel Company of America, Newark, N. J.

Isham, Phillips, 55 Liberty street, New York City.

Knapp, George F., manager of sales department, E. N. Breitung & Co., Cleveland, Ohio.

Kneeland, Edward, treasurer United Engineering & Foundry Company, Pittsburgh, Pa.

McKee, Arthur G., consulting engineer, Cleveland, Ohio.

Meaker, John W., Jr., department sales manager, American Steel & Wire Company, Chicago.

Meredith, William F., president Titanium Alloy Mfg. Company, New York City.

Morris, A. F., sales manager, Morgan Engineering Company, Alliance, Ohio.

Peck, Hal H., Western sales agent, Scullin-Gallagher Iron & Steel Company, Seattle, Wash.

Satler, Charles E., secretary United Engineering & Foundry Company, Pittsburgh, Pa.

Small, George S., manager, United Engineering & Foundry Company, Pittsburgh, Pa.

Lanahan, Frank J., president Fort Pitt Malleable Iron Company, Pittsburgh, Pa.

Snyder, W. E., mechanical engineer, American Steel & Wire Company, Pittsburgh, Pa.

Sproul, William C., president Seaboard Steel Casting Company, Chester, Pa.

Tener, Robert W., United Engineering & Foundry Company, Pittsburgh, Pa.

Thompson, Andrew, manager Titanium Alloy Mfg. Company, Niagara Falls, N. Y.

Waddell, Jacob D., general manager of sales, Brier Hill Steel Company, Youngstown, Ohio.

Walker, Dr. Wm. H., chemist, Massachusetts Institute of Technology, Boston, Mass.

Woodard, L. A., vice-president and general manager, William Tod Company, Youngstown, Ohio.

Edgar, Selwyn C., Jr., Edgar Zinc Company, St. Louis, Mo.

Tests of Cobalt High Speed Tool Steel

In *The Iron Age* of June 19, 1913, reference was made to the new cobalt high speed tool steel, of which tests have been made at the Royal Technical High School, Berlin. Professor Schlesinger, Charlottenburg, in Stahl und Eisen of June 5 publishes an extended account of these tests. Of special interest is the composition of one particular cobalt steel. For the sake of comparison the analysis of one of the ordinary high speed steels used in the tests is also given. They are as follows:

	Cobalt steel "U," per cent.	High-speed steel "N," per cent.
Carbon	0.76	0.88
Silicon	0.28	0.28
Manganese	0.10	0.07
Phosphorus	0.010	0.018
Sulphur	0.032	0.036
Copper	0.06	0.07
Nickel	trace	0.06
Cobalt	5.03	None
Chromium	4.38	5.09
Tungsten	16.40	18.10
Vanadium	0.62	1.16
Molybdenum (about)	0.30	0.60

The author states that the percentage of cobalt in this sample is rather high. It is interesting to compare the record of the results of these two steels in the series of tests. Each steel was made to cut hard chrome-nickel steel of 65 tons tensile strength in a lathe until the tool was dull, at a speed of 83 and 66 ft. per min. with a feed of 1 mm. per revolution and a cut of about 4 mm. thickness; and mild steel of 31 tons tensile strength in the same lathe at a speed of 83 ft. per min. with a feed of 2.5 mm. per revolution and a cut of about 10 mm. thickness; also cast iron of about 10 tons tensile strength at a speed of 100 ft. per min. with the same feed and cut as the mild steel. The results of the tests under these conditions of the two steels referred to above are as follows, including one other cobalt steel which ran unusually high:

	On chrome nickel steel 83 ft. speed;		On chrome nickel steel 66 ft. speed;		On mild steel 83 ft. speed;		On cast iron 100 ft. speed;	
	min.	sec.	min.	sec.	min.	sec.	min.	sec.
Cobalt "U"	5	6	13	54	6	22	9	55
High speed "N"	1	47	5	20	2	52	1	25
Cobalt "S"	5	26	25	36	..	..	..	..

High speed steel "N" is chosen for the above table as the one out of the number shown in Professor Schlesinger's tables which gave the best results of the ordinary tool steels. The end of each test was determined by the dullness of the tool, ascertained scientifically. To make the comparison complete, the value of each grade of steel was determined by dividing the endurance value by the price. The result of this on the hard chrome-nickel class in the case of the three steels mentioned was as follows:

	On chrome-nickel steel at 83 ft. speed	66 ft. speed
Cobalt "U"	40.80	111.50
High speed "N"	7.93	23.70
Cobalt "S"	43.50	205.00

Professor Schlesinger concludes his article with the statement that the application of cobalt to the production of high speed tool steels exerts a marked influence in enhancing the value and endurance without raising the cost price over the average market price.

New Interests in Forest of Dean Iron Mine

There have been reports of a change in ownership of the Forest of Dean iron mine at Fort Montgomery, N. Y. by which an Eastern furnace interest becomes connected with the property. It is understood that what has taken place is the practical completion of negotiations by which M. S. Kemmerer, of Whitney & Kemmerer, New York, acquires an interest in the mine. Mr. Kemmerer is president of the Carbon Iron & Steel Company, Parryville, Pa. The Hudson Iron Company has operated the mine for the past seven years under a lease which expires in September, and the product, about 300 tons a day of magnetite, has been taken by various Eastern furnaces. A description of the mine, its re-equipment after an idleness of 12 years and the aerial system for conveying the ore 1½ miles for loading into Hudson River boats was given in *The Iron Age* of June 21, 1906.

An International Steel Conference

The London Iron and Coal Trades Review of June 20 has the following:

"The managers of the German Steel Syndicate, headed by Mr. Schaltenbrand, general director, are understood to be staying in London for the purpose of discussing the situation of the international market. The discussion is said to be proceeding with representatives of steel producers in Great Britain, the United States and other countries."

The London Ironmonger of June 21 refers to a Berlin dispatch of June 12 to the effect that the directors of the German Steel Works Union together with their chairman, E. Schaltenbrand, had gone to London to confer with representatives of the steel industry in Great Britain. An announcement of the same character appeared in a Belgian financial journal. The Ironmonger further says:

"We believe that, so far at any rate as the chairman of the Stahlwerks Verband was concerned, the principal object of the journey was to attend the periodical meeting of the International Association of Rail Manufacturers. That association which is, of course, distinct from the British Railmakers' Association, usually holds its meetings in Paris, but on the present occasion its members, we understand, foregathered at a hotel on Lake Windermere, which is undoubtedly a more pleasant place at this season than is the French capital, to which, however, several of the delegates, it is said, have adjourned this week. It is very likely, of course, that other matters than steel rails were also more or less informally discussed, and the presence of a number of British manufacturers other than railmakers, and, we believe, of one or more representatives of American interests, lends color to this suggestion. We hear, however, that the general opinion expressed by those who attended the meeting is that such a regulation [of the world's iron production] as suggested in the Berlin telegram is impracticable, and that for the present there seems to be very little prospect of an international agreement. It is more likely, indeed, especially if the condition of trade in the United States and in Europe should become worse as the year wears on, that instead of an international agreement very serious international competition may be seen in the autumn, and if this should happen it is pretty sure that such competition would be most pronounced in the British markets."

Eastern Freight Rate Inquiry

The Interstate Commerce Commission, June 26, announced that it would institute a proceeding of inquiry into the following matters:

"Do the present rates of transportation yield to common carriers by railroad operating in official classification territory adequate revenues? If not, what general course may carriers pursue to meet the situation?"

"In this connection the commission desires to make two observations:

"1. The fact that we have decided further to investigate this subject must not be taken as an intimation that the commission has reached the conclusion that revenues are inadequate, or that rates should be advanced. Upon this question no opinion has been formed.

"2. That the statute gives to any party the right to attack by complaint any rate, and no general conclusion which the commission may reach and announce in this investigation can affect that right."

The inquiry which the commission will thus undertake virtually concedes what the railroads sought and in addition will save an expenditure of about $250,000, the estimated cost of preparing new tariffs which the roads would have been obliged to submit to the commission as a basis for consideration, had the petition for a rehearing been granted.

New Open-Hearth Plant at Lebanon, Pa.

The American Iron & Steel Mfg. Company, Lebanon, Pa., is arranging for the erection of an open hearth steel plant and blooming and billet mills. The steel plant will comprise four 50-ton furnaces.

The Iron and Metal Markets

Activity in Pig Iron

Low Prices Finally Tempt Buyers

Southern No. 2 at $10 for a Time—Lower Warehouse Prices for Finished Steel

The springing up of demand for pig iron in larger volume than has developed at one time in several months has marked the past week, indicating that in the belief of some important buyers prices had at last reached an attractive level. On Southern iron, in particular, tempting prices were named by one or two interests, $10 at Birmingham for No. 2 having been the basis on several large lots. Definite data as to the amount of business done at this figure are lacking, but it is asserted that those who sold at $10 have now withdrawn that price and are holding for $10.50.

Northern sellers in districts in which Southern iron is most largely sold have further lowered their prices in the past week with a resulting increase in business. In northern Ohio a pipe company has closed for 10,000 tons, Southern No. 3 being sold in this case at $9.50 at furnace. Eastern pig iron sales have increased somewhat, and in the Chicago district activity is much more pronounced, good sized contracts with malleable foundries being under negotiation.

The buying movement is by no means general, but it is broadening as the gap grows less between recent prices and the low level of one year ago.

The extent to which the curtailment of pig iron production will go is an important factor. Partial statistics for June indicate that a number of additional furnaces have blown out, in view of the discouraging outlook, several of these being in the South. Some other furnaces are planning to do likewise.

In basic pig iron an inquiry for 5000 tons for third quarter and 8000 tons for fourth quarter has come up in Eastern Pennsylvania, where $15.50 delivered is the present basis. At Pittsburgh the steel company which has been inquiring for 12,000 to 15,000 tons a month through July and August has not yet closed.

The strenuous efforts of the Connellsville coke producers to establish a $2.50 contract price for furnace coke complicate the blast furnaceman's problem, as pig iron declines. A good many furnaces now expect to buy from month to month and $2.25 for prompt coke is maintained by makers without difficulty. In cases where $2.50 was paid for all July delivery it is understood the price was guaranteed. The firmness of the coke market this week has been due, in part, to purchases by furnaces in anticipation of smaller coke output over the holidays.

In a number of finished lines the ability of the mills to make prompter deliveries shows in an easing up of demand upon warehouses and prices for store material have been reduced $2 to $3 a ton.

Thus far, however, there has been no weakening in the contract prices of bars, plates and structural steel. The implement makers appear to have given up any idea of breaking the price of bars, and additional contracts have come in from this source. At the same time buyers do not forget that revisions of such contracts have regularly accompanied any decline in the market.

An Eastern mill took the 5500 tons of plates required for two Government colliers at 1.40c. Pittsburgh, against a bid of 1.42½c. by Pittsburgh mills. On the structural steel for this contract the Pittsburgh quotation was 1.45c. In the Eastern market the Pittsburgh contract basis is now quite common on early delivery plates.

The order of the Southern Railway for 28,000 tons of rails for this year may be divided between the Maryland and Ensley mills. The Tampa & Gulf Coast has inquired for 5000 tons. A 5200-ton contract for the Virginia-Carolina Railway went to the Pennsylvania Steel Company.

Wrought pipe has been one of the most active products on the list. One interest has taken contracts for 155 miles of 8-in. and 44 miles of 12-in. pipe for oil lines. Business likely to be closed soon includes 45 miles of 8-in., 10-in. and 12-in. pipe.

With actual prices for wire products in some cases $2 a ton below the nominal level, that market is drifting, with no well defined indication of the sort of announcement by producers that would give it new life.

A rather better demand for semi-finished steel is reported from Europe, with indications that the sellers of cheap Belgian and French billets are filled up for a time. German prices are lower. From London come reports that lack definiteness of a conference between Continental and British makers of rails and some other products.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous.

	July 2, 1913.	June 25, 1913.	June 4, 1913.	July 3, 1912.
Pig Iron, Per Gross Ton:				
Foundry No. 2 X, Philadelphia..	*$15.75*	$16.00	$16.50	$15.50
Foundry No. 2, Valley furnace.	14.00	14.00	14.25	13.25
Foundry No. 2 S'th'n, Cin'ti...	13.75	13.75	14.25	14.50
Foundry No. 2, Birmingham, Ala.	10.50	10.50	11.00	11.25
Foundry No. 2, furnace, Chicago*	*14.50*	15.00	16.00	14.50
Basic, delivered, eastern Pa....	15.50	15.50	16.50	15.50
Basic, Valley furnace	14.50	14.50	14.50	13.25
Bessemer, Pittsburgh	16.90	16.90	17.50	15.15
Malleable Bessemer, Chicago*...	*14.75*	15.00	16.00	14.50
Gray forge, Pittsburgh	14.65	14.65	14.90	13.90
Lake Superior charcoal, Chicago	*15.75*	16.25	17.50	16.25
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh....	26.50	26.50	26.50	21.50
Open hearth billets, Pittsburgh..	26.50	26.50	25.50	21.50
Open hearth sheet bars.....	27.00	27.00	27.00	22.00
Forging billets, Pittsburgh.....	34.00	34.00	34.00	29.00
Open hearth billets, Philadelphia	28.00	28.00	28.00	24.40
Wire rods, Pittsburgh.....	*28.50*	29.00	30.00	25.00
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	14.00	14.00	15.75	16.00
Iron rails, Philadelphia.....	17.50	17.50	18.00	16.50
Carwheels, Chicago	*13.00*	13.50	14.25	14.00
Carwheels, Philadelphia	13.00	13.00	13.50	14.00
Heavy steel scrap, Pittsburgh..	12.50	12.50	13.00	13.50
Heavy steel scrap, Chicago.....	10.50	10.50	10.50	11.75
Heavy steel scrap, Philadelphia	11.50	11.50	12.00	13.50
Finished Iron and Steel,				
Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.....	1.47½	1.47½	1.57½	1.32½
Iron bars, Pittsburgh.....	1.65	1.65	1.70	1.35
Iron bars, Chicago.....	1.50	1.50	1.50	1.27½
Steel bars, Pittsburgh.....	1.40	1.40	1.40	1.25
Steel bars, New York.....	1.56	1.56	1.56	1.41
Tank plates, Pittsburgh.....	1.45	1.45	1.45	1.30
Tank plates, New York.....	1.61	1.61	1.61	1.46
Beams, Pittsburgh	1.45	1.45	1.45	1.30
Beams, New York	1.61	1.61	1.61	1.46
Angles, Pittsburgh	1.45	1.45	1.45	1.30
Angles, New York.....	1.61	1.61	1.61	1.46
Skelp, grooved steel, Pittsburgh	1.45	1.45	1.45	1.20
Skelp, sheared steel, Pittsburgh	1.50	1.50	1.50	1.25
Steel hoops, Pittsburgh	1.60	1.60	1.60	1.25
Sheets, Nails and Wire,				
Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28 Pittsburgh	2.25	2.25	2.30	1.90
Wire nails, Pittsburgh	*1.70*	1.80	1.80	1.60
Cut nails, f.o.b. Eastern mills...	1.80	1.80	1.80	1.60
Cut nails, Pittsburgh	1.70	1.70	1.70	1.55
Fence wire, ann'l'd, 0 to 9, Pgh.	*1.50*	1.60	1.60	1.40
Barb wire, galv., Pittsburgh:...	*2.10*	2.20	2.20	1.90

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville,

Per Net Ton, at Oven:	July 2, 1913.	June 25, 1913.	June 4, 1913.	July 3, 1912.
Furnace coke, prompt shipment.	$2.25	$2.10	$2.15	$2.15
Furnace coke, future delivery..	2.25	2.25	2.25	2.25
Foundry coke, prompt shipment	2.75	2.75	2.85	2.40
Foundry coke, future delivery..	3.00	3.00	3.00	2.60

Metals,

Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	15.00	15.00	15.75	17.75
Electrolytic copper, New York..	14.62½	14.50	15.25	17.62½
Spelter, St. Louis	5.15	4.95	5.15	7.00
Spelter, New York.....	5.30	5.10	5.30	7.15
Lead, St. Louis.....	4.22½	4.22½	4.20	4.40
Lead, New York	4.35	4.35	4.35	4.50
Tin, New York	41.75	44.10	46.00	46.00
Antimony, Hallett, New York..	8.00	8.15	8.20	7.75
Tin plate, 100-lb. box, Pittsburgh	$3.60	$3.60	$3.60	$3.40

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.45c. to 1.50c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft., down to the weight of 3-16 in., take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.....	.10
Gauges under 3-16 in. to and including No. 2.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over.....	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.45c. to 1.50c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.....	.10
Angles over 6 in. on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, hand rail, car-truck and conductor rail)	.05
Angles, channels and tees, under 3 in. wide as per steel bar card, Sept. 1, 1909.....	.20 to .80
Deck beams and bulb angles.....	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Rods and Wire.—Bessemer, open-hearth and chain rods, $28.50. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.50; galvanized, $1.90. Galvanized barb wire, to jobbers, $2.10; painted, $1.70. Wire nails, to jobbers, $1.70.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.65	$1.70	$1.75	$1.80	$1.90	$2.00	$2.10	$2.20
Galvanized	2.10	2.10	2.15	2.20	2.30	2.40	2.80	2.90

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (full weight), in effect from May 27, 1913, iron pipe (full weight), from June 2, 1913:

Butt Weld.

Steel. Inches.	Black.	Galv.	Iron. Inches.	Black.	Galv.
⅛, ¼ and ⅜	72	51½	⅛ and ¼	66	47
½	76	65½	⅜	65	46
¾ to 3	79	70½	½	69	56
			¾ to 2½	72	61

Lap Weld.

2	76	67½	1¼	56	45
2½ to 6	78	69½	1½	67	56
7 to 12	75	64½	2	68	58
13 to 15	52	..	2½ to 4	70	61
			4½ to 6	70	61
			7 to 12	68	55

Reamed and Drifted.

1 to 3, butt	77	68½	1 to 1½, butt	70	59
2, lap	74	65½	2, butt	71	60
2½ to 4, lap	76	67½	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap	68	59

Butt Weld, extra strong, plain ends.

⅛, ¼ and ⅜	67	56½	⅜	63	52
½	72	65½	½	67	60
¾ to 1½	76	69½	¾ to 1½	71	62
2 to 3	77	70½	2 and 2½	72	63

Lap Weld, extra strong, plain ends.

2	73	64½	1½	65	59
2½ to 4	75	66½	2	66	58
4½ to 6	74	65½	2½ to 4	70	61
7 to 8	67	56½	4½ to 6	69	60
9 to 12	62	51½	7 and 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends.

½	62	55½	½	57	49
¾ to 1½	65	58½	¾ to 1½	60	52
2 to 2½	67	60½	2 and 2½	62	54

Lap Weld, double extra strong, plain ends.

2	63	56¼	2	55	49
2½ to 4	65	58½	2½ to 4	60	54
4½ to 6	64	57½	4½ to 6	59	53
7 to 8	57	46½	7 to 8	52	42

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from May 29, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

Lap-Welded Steel.		*Standard Charcoal Iron.*	
1¼ and 2 in.	60	1½ in.	44
2¼ in.	57	1¾ and 2 in.	48
2½ and 2¾ in.	63	2¼ in.	44
3 and 3¼ in.	67	2½ to 2¾ in.	53
3½ to 4½ in.	69	3 and 3¼ in.	55
5 and 6 in.	63	3½ to 4½ in.	58
7 to 13 in.	60	Locomotive and steamship special grades bring higher prices.	

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from stock, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8	1.70
Nos. 9 to 10	1.75
Nos. 11 and 12	1.80
Nos. 13 and 14	1.85
Nos. 15 and 16	1.95

Box Annealed Sheets, Cold Rolled

Nos. 10 and 11	1.90 to 2.00
No. 12	1.90 to 2.00
Nos. 13 and 14	1.95 to 2.05
Nos. 15 and 16	2.00 to 2.10
Nos. 17 to 21	2.05 to 2.15
Nos. 22 and 24	2.10 to 2.20
Nos. 25 and 26	2.15 to 2.25
No. 27	2.20 to 2.30
No. 28	2.25 to 2.35
No. 29	2.30 to 2.40
No. 30	2.40 to 2.50

Galvanized Sheets of Black Sheet Gauge.

Nos. 10 and 11	2.35 to 2.50
No. 12	2.45 to 2.60
Nos. 13 and 14	2.45 to 2.60
Nos. 15 and 16	2.60 to 2.75
Nos. 17 to 21	2.75 to 2.90
Nos. 22 and 24	2.90 to 3.05
Nos. 25 and 26	3.05 to 3.20
No. 27	3.20 to 3.35
No. 28	3.35 to 3.50
No. 29	3.50 to 3.65
No. 30	3.65 to 3.80

Pittsburgh

PITTSBURGH, PA., July 1, 1913.

July is usually the duliest month in the iron trade. Mills now look for a falling off in specifications and new buying, as a good many plants are closed for inventory and needed repairs. It is estimated that specifications against contracts are now coming in at the rate of about 60 per cent. of output, but on a few lines, notably bars and pipe, they are practically up to capacity. The steel makers refer to the present situation as one in which consumers that have contracts are pressing the mills for delivery as hard as ever, while those who want to buy are doing their best to get the makers to name lower prices. Most of the pessimistic talk that is heard comes from consumers and little of it from the makers. The leading steel companies continue to report that they have actual orders on their books requiring all the material they can make in the next two or three months, and on some products well toward the end of the year. They argue that it would not help business to make a reduction in prices, and are simply allowing the situation to take care of itself. There is still faith in the trade that a buying movement of at least moderate size will come in August or not later than September. The way in which prices of finished products have held up is remarkable. While pig iron has gone off at least $2 a ton, scrap about $3, steel billets and sheet bars about $2, the prices on most finished lines are practically where they were at the opening of the year. The demand for steel bars and pipe is heavy and plates and shapes are being specified for at a good rate. There is a better sentiment in the scrap trade and prices on prompt coke are higher. Wire products continue to drag, and wire nails have settled down to about $1.70 and plain wire to $1.50, these prices being $2 a ton under what has been regarded as the regular market.

Pig Iron.—W. P. Snyder & Co. report the average price of Bessemer iron in June as $16.13 and basic $14.50, f.o.b. Valley furnace. On Bessemer this is a decline of 65c. and on basic of 40c. over the average prices for May. The only active inquiry in the market at present for basic iron is that of the Pittsburgh Steel Company which is asking for prices on 12,000 to 15,000 tons each for July and August. It is now stated that it may be September 1 before the first of this company's blast furnaces will be ready for operation. It is expected that on July 4 three or four furnaces in the new open hearth steel plant of the Pittsburgl Crucible Steel Company at Midland, Pa., will be started, and as soon as this plant gets going it will take the Midland furnace out of the market as a seller of basic iron. The Youngstown Sheet & Tube Company has bought 5000 tons of gray forge iron from a Valley interest to be used in its puddling mills. In spite of the fact that prices of pig iron are low, buyers lack confidence and are placing orders only for such amounts as are absolutely needed for current wants. Hardly enough is being sold to test prices. We quote Bessemer iron at $16; basic, $14.50; malleable Bessemer, $14.25 to $14.50; No. 2 foundry, $14 to $14.25, and gray forge, $13.75, all at Valley furnace, the freight rate to the Pittsburgh district being 90c. a ton.

Billets and Sheet Bars.—The larger steel mills that sell billets and sheet bars in the open market report that the pressure on them from customers for deliveries is just as hard as ever. The Carnegie Steel Company has not steel to spare for outside consumers, other than those they supply regularly, for third quarter, and may not have any to spare for fourth quarter. Republic and Youngstown Sheet & Tube are about in the same condition, and any sales of billets and sheet bars for reasonably prompt delivery that are being made are by the smaller steel mills that ordinarily do not sell in the open market, but come in only occasionally. A sale of 1500 tons of sheet bars, equal deliveries in third quarter, is reported at $27.50, maker's mill. It is stated there have been no important cancellations of contracts for billets and sheet bars, nor do the mills expect there will be. We quote Bessemer and open-hearth billets for prompt and third quarter delivery at $26.50 to $27 and Bessemer and open-hearth sheet bars for same deliveries at $27 to $27.50, maker's mill, Pittsburgh or Youngstown. We quote forging billets at $34 to $35 and axle billets $29 to $30.

Ferroalloys.—New inquiry is confined to an occasional carload or two of ferromanganese for prompt shipment, the market being about $58, seaboard. Consumers are pretty well covered over second half, and while the official price for this delivery is $61, seaboard, it could be shaded $2 to $3 a ton on a firm offer. The freight rate to the Pittsburgh district is $2.16 per ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $75; over 100 tons to 600 tons, $74; over 600 tons, $73, Pittsburgh.

Wire Rods.—The new demand is dull, reflecting present conditions in the wire trade, and specifications against contracts are only fair. We quote Bessemer, open-hearth and chain rods at $28.50 to $29, Pittsburgh.

Muck Bar.—While there is little new inquiry, muck bar for prompt delivery is scarce, due to the shortage of puddlers at all plants. The demand of the Sons of Vulcan for a flat rate of $7 a ton for puddling on July 1 has not yet been granted by the mills that signed its scale. We continue to quote best grades of muck bar, made from all pig iron, at $31, Pittsburgh.

Skelp.—The active condition of the pipe trade is reflected in skelp for which there is a fairly heavy demand. Consumers are specifying heavily against their contracts and prices are firm, the skelp mills being filled for several months. We quote: Grooved steel skelp, 1.45c. to 1.50c.; sheared steel skelp, 1.50c. to 1.55c.; grooved iron skelp, 1.70c. to 1.75c.; sheared iron skelp, 1.75c. to 1.80c.; all delivered to buyers' mills in the Pittsburgh district.

Steel Rails.—Orders taken by the local interest in the past week were for lots ranging from 200 to 500 tons, which aggregated a fair tonnage. The new demand for light rails is quiet, the Carnegie Company receiving new orders and specifications last week for about 2500 tons. The rerolling rail mills continue to take a good part of the business being placed in light rails, as they are underselling rails made from billets from $1 to $2 a ton. The demand for splice bars is quite active. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Plates.—The city of Minneapolis has placed about 1200 tons of plates for an extension to its water works lines with the East Jersey Pipe Company, and the plates will be rolled by the Carnegie Company. New orders for steel cars are light, but the three leading companies are understood to be pretty well filled for this quarter, and are specifying quite freely for plates and shapes. An Eastern mill is the low bidder on 5500 tons of plates for the Government colliers Maumee and Kanawha. On the plates for these two boats one local maker bid 1.42½c., Pittsburgh. On the shapes the Carnegie and Jones & Laughlin Steel companies each bid 1.45c., Pittsburgh. While the new demand for plates is fairly active, the local mills are filled for three or four months, and the business being placed for delivery in two or four weeks is mostly going to the smaller mills. We quote ¼-in. and heavier tank plate at 1.50c. to 1.60c. for delivery in three to four weeks, while for forward delivery 1.45c. at maker's mill is still being quoted.

Structural Material.—The new inquiry is quite heavy and a fair amount of work is being placed. The McClintic-Marshall Construction Company has taken a total of 1075 tons for bridges for elevated track work under way by the Pennsylvania Railroad in this city, 3400 tons for a steel building for the Ford Motor Company at Detroit, Mich., and smaller jobs involving about 1000 tons. The Jones & Laughlin Steel Company has taken a building for the Rochester University, Rochester, N. Y., 200 tons; a Y. M. C. A. building at Cleveland, Ohio, 200 tons; some elevated work for the Santa Fe at Wichita, Kan., 350 tons, and for a paper mill at West Point, Va., 200 tons. The American Bridge Company has taken 1150 tons for an arcade building in the East; the Canton Bridge Company, Canton, Ohio, 200 tons for a highway bridge in Vermont, and the Riverside Bridge Company, Martins Ferry, Ohio, 500 tons for a telephone building at Memphis, Tenn. Fabricators are still complaining of the low prices being made, stating that they leave little or no margin of profit. We quote beams and channels up to 15 in. at 1.45c. to 1.50c. Small lots from warehouse for prompt delivery are bringing from 1.60c. up, depending on the size of the order and the deliveries wanted.

Iron and Steel Bars.—The new demand for steel bars and specifications against contracts in June were heavier than in May, one leading mill stating that its specifications of steel bars in June just about equaled its output. The leading makers of steel bars have actual orders taking their entire output up to October or later, and pressure from customers for deliveries is

as strong as ever. One leading mill reports its output of steel bars in the six months just ended the heaviest in any similar period in its history. There is a continued heavy demand for steel bars for reinforcing work, one leading mill stating it is 16 weeks back in deliveries. The new demand for iron bars has quieted down and prices are only fairly strong. For forward delivery steel bars are firm at 1.40c. at mill, but for shipment in three to four weeks prices from warehouse and other sources of supply are slightly lower than they have been. We quote iron bars at 1.65c. to 1.70c. for delivery in six to eight weeks. The mills continue to charge $1 extra per ton for twisting ¼-in. and larger steel bars and $2 extra for ½ to ⅝ in.

Sheets.—Conditions in this trade are not showing any betterment, the new demand being dull and specifications against contracts not coming in satisfactorily. A good deal of new inquiry is up for both black and galvanized sheets for third and fourth quarter, but mills are not willing to accept prices offered. Some new capacity in black and galvanized sheets has recently come on the market and more is in early prospect, and these new producers are going after orders more aggressively than the older mills, this resulting in unevenness in prices. Several leading makers say they have actual specifications to take a good part of their output during third quarter, while others are not so well fixed and can take orders for reasonably prompt deliveries. This week the American Sheet & Tin Plate Company is operating to 80 per cent. of its sheet mill capacity, but other mills that have a full supply of steel are running practically full. The new demand for blue annealed sheets and electrical sheets is heavy. We quote No. 10 blue annealed sheets at 1.75c.; No. 28 Bessemer black sheets, 2.25c. to 2.35c.; No. 28 galvanized at 3.35c. to 3.50c., and No. 28 tin mill black plate at 2.30c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—There is no improvement in specifications which have been rather light for the past two or three months, and it is probable a number of mills will close for part of July, taking advantage of the lull to make needed repairs. The 24 hot tin mills of the Jones & Laughlin Steel Company at Aliquippa will close July 3 for two weeks, and during the shutdown repairs will be made. The Amalgamated Association has declared a strike at the Pope works of the Phillips Sheet & Tin Plate Company at Steubenville, Ohio, and this is the only labor trouble that has developed in the tin plate trade this year. The American Sheet & Tin Plate Company is operating this week 84 per cent. of its hot tin mill capacity and is still short of steel, buying 2000 tons of open-hearth billets in the open market last week to help out. Little new business is being placed and only for small lots, not enough to test prices. We quote nominally 100-lb. cokes at $3.60 and 100-lb. ternes at $3.45, f.o.b. Pittsburgh.

Bolts and Rivets.—The recent reduction of $4 a ton in prices of rivets has not stimulated new demand to any extent, and specifications against contracts are only fair. Official discounts on bolts are being shaded on desirable orders. Two of the local makers of rivets and bolts say they have orders ahead for about 45 days. It is expected some contracts for rivets will be placed during this month as a number of contracts expired June 30. We quote button-head structural rivets at $2 and cone-head boiler rivets at $2.10 in large lots, terms 30 days net, less 2 per cent. for cash in 10 days. Regular discounts on bolts, which are not firmly held, are as follows, in lots of 300 lb. or over delivered within a 20c. freight radius of maker's works:

Coach and lag screws	80 and 10% off
Small carriage bolts, cut threads	75 and 5% off
Small carriage bolts, rolled threads	75 and 10% off
Large carriage bolts	70 and 2½% off
Small machine bolts, cut threads	75 and 10% off
Small machine bolts, rolled threads	75, 10 and 5% off
Large machine bolts	70 and 7½% off
Machine bolts with C.P.C. and T nuts, small	75 and 5% off
Machine bolts with C.P.C. and T nuts, large	70% off
Square hot pressed nuts, blanked and tapped	$5.70 off list
Hexagon nuts	$6.30 off list
C.F.C. and R. square nuts, tapped and blank	$5.70 off List
Hexagon nuts, ⅝ and larger	$6.60 off list
Hexagon nuts smaller than 9/16	$7.20 off list
C.P. plain square nuts	$5.20 off list
C.P. plain hexagon nuts	$5.50 off list
Semi-finished hexagon nuts ⅝ and larger	85% off
Semi-finished hex. nuts smaller than 9/16	85 and 10% off
Rivets, 7/16 x 6½, smaller and shorter	75, 10 and 10% off
Rivets, metallic tinned, bulk	3½c. per lb. net extra
Rivets, tin plated, bulk	1½c. per lb. net extra
Rivets, metallic tinned, packages	70, 10 and 10% off
Standard cap screws	75, 10, 10 and 7½% off
Standard set screws	75, 10, 10 and 7½% off

Railroad Spikes.—There is no new demand and specifications from the railroads are light. Prices are weak and makers are able to make prompt deliveries. We quote railroad spikes in base sizes, 5½ x 9/16 in., at $1.75 to $1.80, and small railroad and boat spikes in carload and larger lots at $1.80 to $1.85 per 100 lb., f.o.b. Pittsburgh.

Shafting.—New demand continues quiet and only for small lots, while specifications against contracts are not heavy. Some large consumers have not yet covered their requirements for second half. We quote cold-rolled shafting at 60 per cent. off in carload and larger lots, and 55 per cent. off in small lots delivered in base territory. On a very desirable specification and for large tonnage the lower price might be slightly shaded.

Hoops and Bands.—Consumers are pretty well bought up and new demand is quiet. Mills report specifications against contracts as only fairly satisfactory. Prices are said to be firm, and we quote hoops at 1.60c. and bands at 1.40c., with extras on the latter as per the steel bar card.

Wire Products.—The wire trade is still in unsatisfactory condition. New demand is dull and jobbers and retailers are specifying only for such quantities of nails and wire as are absolutely needed to meet current wants. While the official price of wire nails is still $1.80 and annealed wire $1.60, orders have been placed as low as $1.70 for wire nails and $1.50 for wire. Regular prices are as follows: Wire nails, $1.80, base, per keg; cut nails, $1.70 to $1.75; galvanized barb wire, $2.20 per 100 lb.; painted, $1.80; annealed fence wire, $1.60, and galvanized fence wire, $2, f.o.b. Pittsburgh, usual terms, freight added to point of delivery. Jobbers charge the usual advances over these prices for small lots from store.

Merchant Steel.—The new demand is only fair and specifications in June showed a slight falling off as compared with May. One leading mill reports that it has actual orders on its books covering practically its entire output for July and August. We quote: Iron finished tire, 1½ x ½ in. and larger, 1.40c., base; under 1½ x ½ in., 1.55c.; planished tire, 1.60c.; channel tire, ¾ to ⅞ and 1 in., 1.90c. to 2c.; 1⅛ in. and larger, 2c.; toe calk, 2c. to 2.10c., base; flat sleigh shoe, 1.75c.; concave and convex, 1.80c.; cutter shoe, tapered or bent, 2.30c. to 2.40c.; spring steel, 2c. to 2.10c.; machinery steel, smooth finish, 1.85c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.30c.; soft, 3.55c.; coils, hard, 3.20c.; soft, 3.45c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Standard Pipe.—In point of new demand the pipe trade is one of the most active on the whole list. The National Tube Company has taken a contract for 155 miles of 8 in. and another for 44 miles of 12 in. pipe for oil lines. Three or four leading mills report that actual orders for lap weld sizes in June showed a large increase over May. The new demand for butt weld pipe is only fair, but on oil country goods is enormously heavy, and the mills are considerably back in deliveries. An active inquiry is in the market for 45 miles of 8, 10 and 12-in. pipe for Western shipment, which is expected to be placed in the near future. A scarcity is predicted in the supply of iron pipe owing to the trouble in getting enough puddlers. Discounts on iron and steel pipe are reported as being fairly well observed.

Boiler Tubes.—The new demand continues heavy, and several makers state they are turning orders away nearly every day, on which they cannot make the deliveries wanted. One leading mill is sold up for four months on steel boiler tubes and on seamless tubing for practically all of this year. Prices are very firm and another advance in steel boiler tubes in the near future is predicted. Discounts are firmly held.

Coke.—Reports that standard grades of furnace coke have been sold for July delivery at $2.50 at oven are either denied or are qualified by the statement that if such sales were made prices were guaranteed. On account of the holiday this week some furnace operators are afraid they may run short of coke, and are placing orders for additional quantities over their regular contracts, and this has resulted in an advance on prompt coke, which is strong at $2.25 at oven. It is stated that the Wisconsin Steel Company has closed for its furnace coke for last half of the year at $2 at oven, the business going to a Uniontown concern, but it is claimed the coke is not as high in quality as standard makes. The coke operators are maintaining a very firm attitude and claim they will shut down ovens rather than recede from their position of asking $2.50 per net ton for fur-

nace coke for last half of the year delivery. It is probable that a number of furnace operators whose contracts expire on June 30 will buy coke from time to time rather than make contracts at what they regard as an exorbitant price. We note sales of 5000 to 6000 tons of standard furnace coke for prompt shipment at $2.25 to $2.50 at oven. For delivery over last half of the year from $2.25 to $2.50 is named. We quote standard makes of 72-hr. foundry coke at $2.75 to $2.85 for prompt delivery, and $2.90 to $3 per net ton at oven for second half of the year. The Connellsville Courier reports the output of coke last week in the Upper and Lower Connellsville regions as 402,305 net tons, a decrease over the previous week of 8300 tons.

Old Material.—Sentiment in the scrap trade is a little better, and dealers are now less inclined to sell at prices they would have been glad to have taken a week or two ago. There is a strong feeling that prices on scrap have about reached bottom and that higher values may come in the near future. In a week or two consumers that have been holding up shipments will again be taking in scrap. Sales of 1000 to 1500 tons of selected heavy steel scrap are reported at $13, delivered at buyer's mill. We also note sales of 500 to 600 tons of wrought iron turnings at $6.75, delivered buyer's mill. Dealers quote as follows, per gross ton, for delivery in the Pittsburgh district:

Selected heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	$13.00 to $13.50
Ordinary steel scrap	12.50 to 12.75
No. 1 foundry cast	12.75 to 13.00
No. 2 foundry cast	11.50 to 11.75
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.50 to 8.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	14.50 to 14.75
No. 1 railroad malleable stock	11.50 to 11.75
Grate bars	8.25 to 8.50
Low phosphorus melting stock	15.50 to 15.75
Iron car axles	24.50 to 25.00
Steel car axles	17.50 to 17.75
Locomotive axles, steel	21.00 to 21.50
Locomotive axles, iron	25.50 to 26.00
No. 1 busheling scrap	12.00 to 12.25
No. 2 busheling scrap	7.50 to 7.75
Old carwheels	13.75 to 14.00
*Machine shop turnings	6.50 to 6.75
*Cast-iron borings	8.25 to 8.50
†Sheet bar crop ends	14.00 to 14.25
Old iron rails	14.50 to 14.75
No. 1 railroad wrought scrap	13.75 to 14.00
Heavy steel axle turnings	9.00 to 9.25
Stove plate	8.25 to 8.50

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

Chicago

CHICAGO, ILL., July 2, 1913.—(*By Telegraph.*)

Appearances strongly indicate that a turning point has been reached in the local pig-iron market. It is true at least that prices too tempting to be resisted have brought out a very considerable tonnage much of which was taken by some of the closest buyers, and with general buying still brisk furnaces are beginning to take inventory of their situation with a view to assuming a firmer attitude. Evidences of the gradual return to normal conditions in mill deliveries were made more apparent last week by the announcement of a reduction of $2 a ton in the store prices of plates, shapes and bars. This revision is in accordance with the general disappearance of the premiums prompt shipment has commanded. The usual mid-year contracting for second-half requirements, although light, was not altogether lacking and included the booking of rail, structural and bar tonnage. Recent rail inquiry and buying in this market has been almost entirely for the last half of 1913 rather than for next year. Steel-bar tonnage for the week was considerable as the result of the closing of some of the large implement business. The mills were greatly handicapped in their operation by the extreme heat, which with the shutdowns scheduled for the first and second weeks in July will prevent a duplication of the production records of May. Prices for old material do not seem to admit of much further shrinkage and in the past week suffered no radical changes.

Pig Iron.—The local market in the past wek appears to have passed through the period of special "inside" prices and active buying by important consumers, such as characterizes a turning point in the situation. Southern iron equivalent to No. 2 foundry, but offered on a fracture grading, has been sold on the basis of $10, Birmingham, by one large interest, and other Southern iron has also been available on the same basis. The open market for Southern iron stood at $10.50, however, and for the most part has returned to that minimum. On that basis certain of the Northern irons have been sold at competing prices and in combination with stand ard Northern irons have been available at average quotations below $15 at the furnace. Shading on malleable Bessemer was not so severe, but it is doubtful if any desirable tonnage was secured by the furnaces at higher quotations than $15, f.o.b. furnace. Lake Superior charcoal iron has been sold as low as $15.75, delivered Chicago. Indications are that the orders being booked, while well distributed among the melters, will show a degree of conservatism in the matter of size. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4	$15.75 to $16.75
Northern coke foundry, No. 1	15.00 to 15.50
Northern coke foundry, No. 2	14.50 to 15.00
Northern coke foundry, No. 3	14.00 to 14.50
Southern coke, No. 1 foundry and No. 1 soft	14.85 to 15.35
Southern coke, No. 2 foundry and No. 2 soft	14.35 to 14.85
Southern coke, No. 3	13.85 to 14.35
Southern coke, No. 4	13.35 to 13.85
Southern gray forge	13.35 to 13.85
Southern mottled	13.35 to 13.85
Malleable Bessemer	14.75 to 15.25
Standard Bessemer	18.40
Basic	14.75 to 15.25
Jackson Co. and Kentucky silvery, 6 per cent.	20.40
Jackson Co. and Kentucky silvery, 8 per cent.	21.40
Jackson Co. and Kentucky silvery, 10 per cent.	22.40

(By Mail)

Rails and Track Supplies.—Activity in the past week in standard rails resulted in the placing on the books of local mills a very fair tonnage for last half delivery. A northern Ohio mill also booked a quantity of traction rails. The 28,000 tons for which the Southern Railway is negotiating will be placed shortly, to be delivered during the remainder of the year. Regarding the reports of inquiries for rails for 1914 delivery, it is stated that such inquiries have not appeared in this market. We quote standard railroad spikes at 1.80c., base; track bolts with square nuts, 2.30c. to 2.40c., base, all in carload lots, Chicago; tie plates, $33 to $35 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Materials.—The closing of several last half contracts for structural shapes is reported, the aggregate of these and of current orders showing somewhat of an improvement. Contracts for fabricated steel placed last week covered only small jobs, with the exception of the lock gates for the Government works at Dallas, Ore., for which 1169 tons will be supplied by the Independence Bridge Company. The American Bridge Company was awarded 131 tons for the Brown & Bigelow factory at St. Paul, and 161 tons of plate girder spans for the Great Northern Railway. The Vierling Steel Company will furnish 182 tons for the First National Bank Building at La Porte, Ind.; the Chicago Steel Products Company, 315 tons for the Lake Shore & Michigan Southern Railway at Englewood, and the Modern Steel Structural Company, 109 tons for the Hans Motor Equipment Company at La Crosse, Wis. Other contracts let included 127 tons for the improvement of the Seattle, Wash., port, 145 tons for the Atchison, Topeka & Santa Fe Railway Company and 315 tons for the St. Joseph Lead Company at Herculaneum, Mo. With respect to prices the mill situation continues without appearance of weakness, although delivery of some sizes of shapes can be obtained from mill as early as two weeks and generally prompt shipment is available on a full range of sizes. We quote for Chicago delivery, mill shipment, 1.63c.

The marked improvement in delivery of structural material from mill has detracted correspondingly from the premium attaching to the prompt shipments available from store. As a readjustment to meet this modified status, local jobbers have reduced their quotations on structural shapes out of warehouse $2 a ton and now quote for Chicago delivery 1.95c. Tonnage, it is reported, is well maintained.

Bars.—Contracting for steel bars by some of the larger implement interests, which has been delayed much beyond the customary time, is reported as a feature of the past week, resulting in considerable tonnage. Bar iron business is very light, but because of the hot weather of the past week mill output has been correspondingly cut down. The pressure to sell has not been heavy and the price of 1.50c. continues to obtain. The holiday of the current week will be made the occasion for a shut down, at least from Thursday

until Monday, at all of the local mills. We quote for mill shipment as follows: Bar iron, 1.50c. to 1.55c.; soft steel bars, 1.58c.; hard steel bars, 1.6cc.; shafting in carloads, 58 per cent. off; less than carloads, 53 per cent. off.

Changes in store prices last week include a reduction of $2 a ton on steel and iron bars. For delivery from store, we quote soft steel bars, 1.85c.; bar iron, 1.85c.; reinforcing bars, 1.85c. base with 5c. extra for twisting in sizes ¾ in. and over, and usual card extras for smaller sizes; shafting 53 per cent. off.

Plates.—The placing of orders for car steel in the past 10 days, although in other territory, is of indirect interest in this market as adding to the general aggregate of plate tonnage on the books. There is a fair inquiry and buying of tank steel for boiler shops, but the situation presents no important features. We quote for Chicago delivery from mill, 1.63c.

A revision in the price of plates out of store corresponding to the reduction in structural shapes is announced, making the Chicago delivered price on base size from store 1.95c. This reduction is not so surprising in view of the light demand for plates for several weeks past.

Old Material.—There has been no appreciable increase in the consumptive demand for scrap in this market, but a noticeable decrease in the amount coming out from country dealers gives to the market a somewhat better appearance. Railroad offerings of last week were not absorbed with any great eagerness and the prices obtained were approximately at the quoted market. An interesting item among old material offered for sale in the current week is 540 tons of old iron rails on a list of 4200 tons from the Great Northern. The Chicago & Northwestern is asking bids on 3100 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	$14.00 to $14.50
Old steel rails, rerolling	12.25 to 12.50
Old steel rails, less than 3 ft.	11.25 to 11.75
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	13.00 to 13.50
Heavy melting steel scrap	10.50 to 11.00
Frogs, switches and guards, cut apart	10.50 to 11.00
Shoveling steel	10.00 to 10.50
Steel axle turnings	7.50 to 8.00

Per Net Ton.

Iron angles and splice bars	$13.50 to $14.00
Iron arch bars and transoms	13.75 to 14.25
Steel angle bars	10.00 to 10.25
Iron car axles	19.25 to 19.75
Steel car axles	16.75 to 17.25
No. 1 railroad wrought	10.50 to 10.75
No. 2 railroad wrought	9.75 to 10.25
Cut forge	9.75 to 10.25
Steel knuckles and couplers	10.00 to 10.25
Steel springs	10.00 to 11.00
Locomotive tires, smooth	11.50 to 12.00
Machine shop turnings	4.75 to 5.25
Cast and mixed borings	4.75 to 5.25
No. 1 busheling	8.50 to 9.00
No. 2 busheling	6.50 to 7.00
No. 1 boilers, cut to sheets and rings	7.25 to 7.75
Boiler punchings	11.75 to 12.25
No. 1 cast scrap	10.50 to 11.00
Stove plate and light cast scrap	8.75 to 9.25
Railroad malleable	10.75 to 11.25
Agricultural malleable	9.75 to 10.25
Pipes and flues	7.25 to 7.75

Sheets.—In this market competitive conditions as affecting the price of black and galvanized sheets show no appreciable change. Concessions of from $1 to $3 on galvanized and $2 on black sheets are generally current. Tonnage being engaged for both immediate shipment and on contracts is moderate. We quote for Chicago delivery in carloads from mill: No. 28 black sheets, 2.48c. to 2.53c.; No. 28 galvanized, 3.53c. to 3.58c.; No. 10 blue annealed, 1.93c.

Although there has been no official reduction in store prices for sheets in keeping with the weaknesses displayed in the mill selling, sales by jobbers in competitive territories are made at such concessions as the situation demands, and a generally accepted revision of sheet quotations from store involving reductions of $2 to $3 a ton is not unlikely to become established. Nominally store prices are as follows: No. 10 blue annealed, 2.25c.; No. 28 black, 2.90c.; No. 28 galvanized, 4.15c.

Rivets and Bolts.—The usual annual contracting for bolts, ordinarily completed a number of weeks earlier than July 1, has been almost entirely neglected. Some signs of interest began to show last week and several small contracts were placed. Prices are soft. Rivet selling is very light and quotations show no improvement. We quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 75-10-2½; cut thread, 75-7½; larger sizes, 70-7½; machine bolts up to ⅜ x 4 in., rolled thread, 75-10-7½; cut thread, 75-10-2½; large size, 70-10; coach screws, 80-12½; hot pressed nuts, square head, $5.70 off per cwt.; hexagon, $6.30 off per cwt. Structural rivets, ¾ to 1¼ in., 2.08c., base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ⅜ x 4 in., 70-7½; larger sizes, 65-5, carriage bolts up to ⅜ x 6 in., 70 5; larger sizes, 65 off. Hot pressed nuts, square head, $5.30, and hexagon, $5.90 off per cwt.

Wire Products.—The situation presents no unusual features apart from the usual midsummer dullness. Both sales and mill operations are reduced in volume. Our quotations, which are on business with jobbers, are nominal, sales being at $1 to $2 a ton less: Plain wire, No. 9 and coarser, base, $1.78; wire nails, $1.98; painted barb wire, $1.98; galvanized, $2.38; polished staples, $1.98; galvanized, $2.33, all Chicago.

Cast-Iron Pipe.—The award of 2000 tons of pipe at Cincinnati, Ohio, has not yet been made, but it is expected that the United States Cast Iron Pipe & Foundry Company, the low bidder, will furnish the pipe. The contract for 2500 tons of pipe at Springfield, Ohio, is still unplaced. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $28.50; 6 to 12 in., $26.50; 16 in. and up, $25.50, with $1 extra for gas pipe.

Philadelphia

PHILADELPHIA, PA., July 1, 1913.

Pig iron sales are still at the expense of prices. Competition is keen for business offered, either small or large, and lower prices in foundry grades have again developed. Inquiry is better but business closes slowly. More interest is shown in steel making grades of iron. Eastern heavy plate makers are not holding the recent 1.75c. quotation very firmly, but on desirable business will go to 1.65c., delivered here. The demand for nearly all classes of finished products is easier. Mills are preparing for the usual midsummer suspensions for repairs, which will vary from three days to a week. Melting capacity will be idle, as a rule, for three days. The coke market is firmer, higher asking prices being named for spot furnace coke. The old material market is practically at a standstill.

Pig Iron.—A comparatively large volume of business was transacted during June, although almost every important sale uncovered a new low price. The market is still easy, and it is doubted that the bottom has been reached in some grades, notwithstanding the fact that at the present levels producers are not getting a new dollar for an old one. Southern iron is still below the prices quoted for the principal eastern Pennsylvania brands and is an important factor when any large quantity is involved. Actual sales during the week have involved no large quantities. The Baldwin Locomotive Works advises that it will not close against its recent inquiry for 2000 to 4000 tons for several days. A good volume of small business in foundry grades is moving at $16 for early delivery. A New Jersey stove manufacturer has an inquiry out for 1500 tons for last half delivery and a Delaware River pipe maker is in the market for 5000 tons of low-grade iron for third quarter. There has been little movement in pipe-making grades in this district the past week. Virginia foundry iron has been moving somewhat more freely at $13.50 at furnace for No. 2 X, and this price might be shaded if the quantity was interesting. A sale of 1000 tons for Western shipment, at full prices, is reported. Some little movement in coke malleable is noted. There has been no demand for rolling mill forge. More interest is shown in steel making grades of iron. A central Pennsylvania basic consumer has been feeling the market for 5000 tons for third quarter and will require 8000 tons for fourth quarter. A trade deal involving 1000 tons of basic has also been under negotiation. The general opinion, in the absence of actual sales in this market, places the price of basic at $15.50, delivered. Moderate sales of standard analysis low phosphorus iron have been made at $23.50, delivered, while Lebanon Valley low phosphorus is held at $19 at furnace. Prices continue irregular in nearly all grades, quotations being based largely on individual transactions and practically every seller is anxious to place tonnage on order books. The following range about represents the market for standard brands, delivered in buyers' yards in this district:

Eastern Pennsylvania No. 2 X foundry	$15.75 to $16.25
Eastern Pennsylvania No. 2 plain	15.50 to 15.75
Virginia No. 2 X foundry	16.30 to 16.50
Virginia No. 2 plain	16.05 to 16.25
Gray forge (nominal)	15.25
Basic	15.50
Standard low phosphorus	23.50

Iron Ore.—No movement has been reported. Importations during the week include 9700 tons from Newfoundland, 4200 tons from Venezuela, 7839 tons from Sweden and 10,530 tons from Cuba.

Ferroalloys.—Odd carloads of 80 per cent. ferromanganese have been sold at $60 seaboard. Forward ferromanganese is nominally quoted at $61. Importations during the week aggregated 1164 tons. Ferrosilicon is quiet with prices firm.

Billets.—New business comes in slowly, but specifications continue good and mills are operating at full capacity. Basic open-hearth rolling billets are a trifle more firmly held at $28, delivered, but little doubt is expressed that concessions could be had on a round tonnage. Forging billets are strong at $34, Eastern mill, for ordinary analysis specifications.

Plates.—With deliveries on Western plates steadily improving, Eastern mills have shown a disposition to recede from their firm position at 1.75c. delivered here, and on desirable competitive business are now quoting 1.65c. The differential of $1 between universal and sheared plates is no longer observed. Western plates, which are available in six weeks, are quoted at 1.60c. to 1.65c. here. Current orders are good and together with specifications aggregate close to mill capacity. Some contracts for boat plates have been closed, one Eastern mill being the low bidder on a considerable tonnage for Government colliers to be built on the Pacific coast.

Structural Material.—New business in large fabricated work drags, although a fair amount of miscellaneous business in plain shapes is coming to the mills. Rolling schedules are decidedly easier, and good delivery can be had on nearly all classes of shapes. Among the new projects is 3000 tons for the new steel plant of the American Iron & Steel Mfg. Company at Lebanon, Pa., and several thousand tons for the addition to the Ritz-Carlton Hotel in this city. The contracts for the Baltimore & Ohio bridges, 3000 tons, are still unplaced. Prices of plain shapes are unchanged at 1.60c. to 1.65c. delivered in this vicinity.

Sheets.—Current business is made up of small orders, largely for urgent prompt shipment. Mill capacities are well taken. Prices are unchanged at 1.90c. here for Western No. 10 blue annealed sheets, with Eastern mills occasionally obtaining 1.95c. for spot shipments. Prices of lighter sheets continue weak.

Bars.—Orders for ordinary iron bars have been confined to small lots for which competition is sharp. Ordinary iron bars are weak at 1.47½c. to 1.52½c., delivered in this district. Pending business in contract steel bars moves slowly. Steel bars are firmly maintained at 1.55c., delivered in this vicinity.

Coke.—Producers and consumers are still at variance regarding prices for forward delivery. In instances higher prices for prompt coke have been named, but buyers continue to hold off. Forward furnace coke is firm at $2.50 at oven, and, while $2.15 has been done for prompt coke, up to $2.47½ has been quoted. Small sales of foundry coke continue to be made at about $3 at oven. The following range of prices, per net ton, is named for delivery in buyers' yards in this vicinity:

Connellsville furnace coke	$4.05 to $4.50
Connellsville foundry coke	4.90 to 5.35
Mountain furnace coke	3.75 to 4.10
Mountain foundry coke	4.50 to 5.00

Old Material.—The market is practically at a standstill. Mills show a disinclination to place any orders until after the usual holiday suspensions. What little buying has been done has been by brokers who had sold short. In the principal grades prices remain unchanged, although forced sales have in some instances been made at lower levels. Quotations are largely nominal. An approximate range for delivery in buyers' yards in this district, covering eastern Pennsylvania, taking freight rates varying from 35c. to $1.35 per gross ton, is as follows:

No. 1 heavy melting steel	$11.50 to $12.00
Old steel rails, rerolling (nominal)	14.00 to 14.50
Low phosphorus heavy melting steel scrap (nominal)	15.50 to 16.00
Old steel axles (nominal)	17.50 to 18.00
Old iron axles (nominal)	25.00
Old iron rails	17.50 to 18.00
Old carwheels	13.00
No. 1 railroad wrought	14.50 to 14.75
Wrought-iron pipe	11.50 to 12.00
No. 1 forge fire	10.00 to 10.50
No. 2 light iron (nominal)	6.00
No. 2 cut busheling (nominal)	8.00
Wrought turnings	8.00 to 8.25
Cast borings	8.00 to 8.25
Machinery cast	13.00 to 13.50
Grate bars, railroad	9.00 to 9.50
Stove plate	9.00 to 9.50
Railroad malleable (nominal)	11.50 to 12.00

Cleveland

CLEVELAND, OHIO, July 1, 1913.

Iron Ore.—Furnaces that have not yet covered for all of their ore requirements continue to hold off, waiting developments in the pig-iron market. Some furnaces will have to buy ore or go out of blast later in the year. However, any business that may come from this source will probably not be placed before well along in the summer. Shipments continue very heavy in spite of delays caused by fogs on Lake Superior. We quote prices as follows: Old range Bessemer, $4.40; Mesaba Bessemer, $4.15; old range non-Bessemer, $3.60; Mesaba non-Bessemer, $3.40.

Pig Iron.—The prevailing low prices, the expiration of first half contracts and the fact that many consumers who have some iron left over must provide for an additional supply within the next 30 days have resulted in a considerably more active market in foundry grades. During the week a good volume of business was booked, largely for the last half. Some sellers have bought only for the third quarter, and others not satisfied that the bottom has been reached bought spot iron. The Massillon Iron & Steel Company, Massillon, Ohio, has bought 2000 tons of No. 3 Southern iron and about 8000 tons of No. 3 Northern and gray forge for delivery during the last five months of the year. The Griscom-Russell Company, Massillon, whose inquiry for 2000 tons of foundry iron was noted last week, has also purchased its required tonnage. Two orders taken in Erie, Pa., aggregate 1500 tons. A Cleveland foundry bought 900 tons of No. 2 for the last half at $14.75, delivered, which indicates that the local market is well established at that price. Several other sales in lots of 500 tons and under are reported. In the Valley prices on foundry iron appear to be maintained at $14 for No. 2. While this price has been shaded and a lower quotation might possibly still be secured some last half business has been done at $14.10. One sale is reported at $14.10 for delivery extending through January and February of next year and another at the same price for the last half also included requirements for the first quarter at $14.40, or an advance of 30c. a ton for delivery after January 1. The 2000-ton sale of Southern iron noted above was made at $9.50 for No. 3 or on the basis of $10 for No. 2. While one interest is understood to have sold considerable Southern iron at $10, Birmingham, in other territories the minimum quotation here for No. 2 in lots of 500 tons or over appears to be $10.50 at furnace. For prompt shipment and during the last half we quote, delivered Cleveland, as follows:

Bessemer	$16.90
Basic	15.25
Northern No. 2 foundry	14.75
Southern No. 2 foundry	$14.85 to 15.10
Gray forge	14.50
Jackson County silvery, 8 per cent. silicon	20.55

Coke.—The demand for foundry coke contracts for the last half is quite active, most consumers having waited until the end of June before coming into the market. Prices are well maintained at $2.75 to $3 per net ton at oven, the latter being the ruling price for most of the better grades for the last half. We note the sale of 1000 carloads of Wise County, Va., coke at $2.75 for delivery until July 1, 1914. The deadlock between producers and consumers over furnace coke prices for the last half continues, the former apparently holding firmly to $2.50.

Finished Iron and Steel.—The market is quieter. Specifications are lighter and there is only a moderate volume of current orders. While the new demand is not active, consumers continue to crowd the mills for deliveries on old specifications. Mills that are in fairly good shape on deliveries and are looking for business report a satisfactory volume of last half contracts for steel bars, plates and structural material. Effective July 1, local warehouse prices were reduced $2 a ton for steel bars and $3 a ton for plates and shapes, the present quotation being 2c. and 2.10c. respectively. Warehouse business has slumped considerably because of the ability of some of the mills to make fairly prompt delivery. For the same reason very few mill orders are being taken at premium prices for quick shipment. Considerable structural work is coming out, requiring small lots, and there is a good demand for twisted bars for reinforcing work. Sheet prices continue weak, with quotations at 2.25c. to 2.35c., Pittsburgh, for No. 28 black, and 3.30c. to 3.40c. for No. 28 galvanized. The demand for wire is light and so-called regular prices on wire and wire nails are not being maintained. The Lorain, Ashland & Southern Rail-

road has placed an order for 300 tons of standard section rails. Its requirements will probably aggregate 1500 tons. There is very active demand for light rails. Mills making new rails are not generally meeting prices quoted on rerolled rails.

Old Material.—The market shows no improvement. There is practically no local demand. Two Cleveland mills are shut down for their annual repairs, and others are out of the market and refuse to buy even at considerable price concession. Local dealers are doing a limited business in small lot sales to mills outside of Cleveland. Prices are weak and quotations on several grades are lower. While dealers think that prices have about reached the bottom, an advance is not expected within the next 60 days. We quote f.o.b. Cleveland as follows:

Per Gross Ton.

Old steel rails, rerolling	$13.00 to $13.50
Old iron rails	14.50 to 15.00
Steel car axles	17.00 to 17.50
Heavy melting steel	10.75 to 11.00
Old carwheels	13.00 to 13.25
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	10.00 to 10.50
Railroad malleable	11.50 to 12.00
Light bundled sheet scrap	9.00 to 9.50

Per Net Ton.

Iron car axles	$21.00 to $22.00
Cast borings	6.25 to 6.50
Iron and steel turnings and drillings	4.50
Steel axle turnings	8.00 to 8.50
No. 1 busheling	10.00 to 10.25
No. 1 railroad wrought	11.00 to 11.50
No. 1 cast	11.00 to 11.50
Stove plate	8.00 to 8.25
Bundled tin scrap	11.00 to 11.50

Birmingham

BIRMINGHAM, ALA., June 30, 1913.

Pig Iron.—With five or six stacks already banked or blown out or to be out within a few days, further increase in accumulations of pig iron on Alabama yards is improbable. Five furnaces are already out. A Tennessee stack is expected to blow out as soon as raw material on hand is worked up. Accumulations on yards have reached 200,000 tons, but will, it is believed, decrease with the large sales made by the Woodward and other interests. The inquiry is better than it has been, but as far as known there has been no response to $10 offers. The reputed sale of 25,000 tons at that figure to the pipe interests is the only one credited at that figure. One furnace interest, which disposed of 1200 tons during the week, secured $11 for all the iron and turned down an offer on a considerable tonnage at $10.50. An offer of 1500 tons at $10 was also turned down by a company holding to $11. Round lots of No. 3 have been sold at $10.50 and of No. 4 at $10.25. The general impression is that the sale of 25,000 tons to the pipe interests has stimulated rather than repressed trade. It would appear that Southern furnaces have decided upon $10.50 as bottom, with the exception noted. Inquiries for as much as 5000 tons are pending. We quote Alabama iron per gross ton f.o.b. furnaces, the first figure being the reputed minimum and the second the basis asked by several furnace interests as follows:

No. 1 foundry and soft	$11.00 to $11.50
No. 2 foundry and soft	10.50 to 11.00
No. 3 foundry	10.00 to 10.50
No. 4 foundry	9.75 to 10.25
Gray forge	9.50 to 10.00
Charcoal	24.00 to 25.00

Cast Iron Pipe.—Manufacturers continue to receive a fair consignment of orders for extensions and repairs and the Bessemer plant of the United States Cast Iron Pipe & Foundry Company booked an order of 800 tons for San Diego. The Southern producers are expecting to land some of the Buenos Ayres and West Indies business, but no contracts are reported. Production is still at a lower ebb than usual and prices are $22 for 4-in. and $20 for 6-in. and upward f.o.b. pipe yards, with $1 added for gas pipe.

Coal and Coke.—Foundry coke is selling at the same price that has maintained for several months and there seems no let-up in the demand. The banking of Tennessee furnaces will cause a drop in the demand for Alabama furnace coke and the banking of several Alabama furnaces makes a problem with regard to disposition both of coal and coke. There has been no cut in prices as yet, and the trade is waiting to see if the general demand will enable the continuance of full operations. Prices on coke continue per net ton at ovens as follows: Furnace coke, $3 to $3.50; foundry, $3.50 to $4.

Old Material.—Wrought and steel scrap move in small and regular quantities; otherwise the old material market is without feature. Concessions are probably offered where there is any considerable business. Stocks on yards are not accumulating and there is general dullness. Nominal quotations per net ton f.o.b. dealers' yards are as follows:

Old iron axles (light)	$15.00 to $15.50
Old steel axles (light)	15.00 to 15.50
Old iron rails	13.50 to 14.00
No. 1 R. R. wrought	12.00 to 12.50
No. 2 R. R. wrought	10.00 to 10.50
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	8.50 to 9.00
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	10.50 to 11.00
Tram carwheels	10.50 to 11.00
Standard carwheels	12.00 to 12.50
Light cast and stove plate	8.25 to 8.75

Cincinnati

CINCINNATI, OHIO, July 1, 1913.

Pig Iron.—Prices have now reached a level where iron merchants have no hesitancy in urging their customers to buy for future wants. Although there has been considerable quiet buying, consumers are not yet disposed to plunge in too deeply. However, they are taking more interest in market conditions, but, while believing that present quotations represent bargains, they evidently do not think there is any danger in continuing the waiting policy adopted some time ago. Among purchasers of foundry iron during the past few days were two in Indiana who took approximately 1000 tons each for last half shipment. For nearby shipment 500 tons of No. 2 Southern foundry went to an Ohio melter. All of these contracts were made on a basis of $10.50 Birmingham, and it is now generally believed that this is minimum, but firm offers might again bring out a lower figure. In the face of this, several small sales of Southern iron were made at $11, Birmingham basis. Speculative iron in the Hanging Rock district has tended to weaken the market for southern Ohio brands. While there is no furnace iron available below $14.50, Ironton, there have been offers solicited at $14, but, so far as is known, there were no sales made even at this figure. A Pennsylvania pipe maker is inquiring in this market for 5000 tons of gray forge and No. 3 foundry for July-August shipment, and there is a request from northern Ohio for 1000 to 1500 tons of Southern foundry iron for last half delivery. A sale of 1000 tons of malleable was made to a Western consumer. The silvery irons are moving only in carload lots and the full market prices appear to be minimum. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft	$14.25 to $14.75
Southern coke, No. 2 foundry and 2 soft	13.75 to 14.25
Southern coke, No. 3 foundry	13.25 to 13.75
Southern, No. 4 foundry	12.75 to 13.25
Southern gray forge	12.25 to 12.75
Ohio silvery, 8 per cent. silicon	20.20 to 20.70
Southern Ohio coke, No. 1	16.70 to 17.20
Southern Ohio coke, No. 2	15.70 to 16.20
Southern Ohio coke, No. 3	15.45 to 15.95
Southern Ohio Malleable Bessemer	15.70
Basic, Northern	15.70 to 15.95
Lake Superior charcoal	18.75 to 19.25
Standard Southern carwheel	27.25 to 27.75

Coke.—The market appears to be gaining strength, especially as to furnace coke. It is now stated that the standard 48-hr. brands in the Connellsville and Wise County fields are held at $2.50 per net ton at oven on any contract business. Pocahontas prices are nearly as strong. Prompt shipment quotations also appear to be firmer around $2.25 per net ton at oven in all three districts. There is not much contracting in furnace coke, but the foundries have bought to fill their future requirements, and those who have not yet purchased are looking around with a view of getting under cover. Foundry grades are close to $3 in the three producing districts for either prompt or contract business, although a few brands can be bought probably 25c. a ton cheaper.

Finished Material.—In almost every line the trade seems to be holding up fairly well, and while a slackening in business is naturally expected by local warehouse dealers this has not yet taken place. The new demand for sheets is a trifle slow at the moment, but specifications on contracts are not being held up and the outlook is probably more promising than in some other lines of finished material. The local warehouse price of steel bars is around 2.05c. to 2.10c., with structural material around 2.10c. to 2.15c. a lb.

Old Material.—Local scrap dealers continue making

pessimistic reports. The low price of pig iron undoubtedly affects many kinds of scrap. Buying is at a low ebb, with no improvement in sight. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio, and the maximum quotations are dealers' prices, f.o.b. at yards:

Per Gross Ton.		
Bundled sheet scrap	$7.25 to	$7.75
Old iron rails	12.25 to	12.75
Relaying rails, 50 lb. and up	19.75 to	20.25
Rerolling steel rails	11.25 to	11.75
Melting steel rails	9.50 to	10.00
Old carwheels	11.00 to	11.50
Per Net Ton.		
No. 1 railroad wrought	$9.25 to	$9.75
Cast borings	4.75 to	5.25
Steel turnings	4.75 to	5.25
No. 1 cast scrap	9.00 to	9.50
Burnt scrap	6.50 to	7.00
Old iron axles	16.75 to	17.25
Locomotive tires (smooth inside)	10.25 to	10.75
Pipes and flues	6.00 to	6.25
Malleable and steel scrap	7.50 to	8.00
Railroad tank and sheet scrap	4.75 to	5.25

St. Louis

ST. LOUIS, MO., June 30, 1913.

The extreme heat prevailing for the past several days in this territory has led to additional slackening of business, as much from a disinclination for activity as from any change in the business situation basically. Aside from more or less shutting down of plants for repairs and midsummer inventory, there is no reported decrease in plant operations.

Pig Iron.—Hand-to-mouth buying continues to prevail, the unquestioned disposition being to wait for positive adjustments before making long time commitments. The insistence on shipment of allotments continues and melting is keeping up well from present indications. In the sales of the week were several 200-ton and 300-ton lots and one or two of 500 tons. The largest transaction involved about 2000 tons of Northern coke iron and Lake Superior charcoal iron, partly for shipment in July and August and about half for last half. Inquiries were mostly for small lots, with the exception of one for 1800 tons of coke iron and one for 1500 tons of malleable. Both these, however, are regarded as being put out for the purpose of evening up some recent higher priced purchases and not as actual needs.

Coke.—The market stiffened during the week materially. Transactions, however, remained at a low ebb, being altogether in small tonnages, the largest reported being for 400 tons. Shipments on allotments continue to keep up a steady pace.

Finished Iron and Steel.—There has been a slight further slackening in new business, but consumption is keeping up and shipments on contracts are being urged forward with no abatement of the insistence which has previously prevailed. The fabricating shops seem to be getting ahead of their previous rush, but are still busy, though they report that new work is not coming out in as large quantities as heretofore. Steel rails, save for a sale of 1800 tons, have shown no marked activity, chiefly because this is the closing period of the fiscal years of the roads of this section. This same situation affects track fastenings, which have been somewhat soft but are expected to show a little more activity soon. Light rails have been in slow demand, neither lumber nor coal roads having appeared in the market. Bars are actively in request and reinforcing material is in good demand. Agricultural and wagon interests are still taking material as fast as they can get it and asking for more.

Old Material.—The scrap market continues to drop in a way to lead to a belief that there is no bottom. Dealers are not trading among themselves, nor even laying in material against a rise in the market. There is practically no demand for scrap, and large quantities are coming on the market, including this week 3000 tons from the Missouri Pacific, 3000 tons from the Big Four and 300 tons from the New Orleans & Northeastern, with more and heavier offerings indicated later in the week. The mills are not buying and in many instances an embargo has been placed against receipt of scrap already contracted for, this being due to the congested conditions of the yards. The midsummer shut-downs for repairs and inventory are here also, the Helmbacher plant of the American Car & Foundry Company leading off. Relaying rails are the only item in good demand, but as they are not to be obtained there is necessarily little doing. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton.		
Old iron rails	$11.00 to	$11.50
Old steel rails, rerolling	11.50 to	12.00
Old steel rails, less than 2 ft.	9.50 to	10.00
Relaying rails, standard section, subject to inspection	23.00 to	24.00
Old carwheels	11.50 to	12.00
Heavy melting steel scrap	9.50 to	10.00
Frogs, switches and guards cut apart	9.25 to	9.75
Per Net Ton.		
Iron fish plates	$10.00 to	$10.50
Iron car axles	17.50 to	18.00
Steel car axles	15.00 to	15.50
Wrought arch bars and transoms	12.50 to	13.00
No. 1 railroad wrought	9.00 to	9.50
No. 2 railroad wrought	8.25 to	8.75
Railroad springs	8.00 to	8.50
Steel couplers and knuckles	8.00 to	8.50
Locomotive tires, smooth	9.50 to	10.00
No. 1 dealers' forge	6.00 to	6.50
Mixed borings	3.50 to	4.00
No. 1 busheling	7.50 to	8.00
No. 1 boilers, cut to sheets and rings	4.50 to	5.00
No. 1 cast scrap	8.50 to	9.00
Stove plate and light cast scrap	7.00 to	7.50
Railroad malleable	7.50 to	8.00
Agricultural malleable	6.50 to	7.00
Pipes and flues	5.50 to	6.00
Railroad sheet and tank scrap	4.00 to	4.50
Railroad grate bars	6.00 to	6.50
Machine shop turnings	5.00 to	5.50
Bundled sheet scrap	4.00 to	4.50

San Francisco

SAN FRANCISCO, CAL., June 24, 1913.

While the general consuming demand continues fairly large, some indications of curtailment are observed. Many important inquiries expected this summer in connection with development and heavy construction have failed to materialize, and some of the largest consumers are out of the market, leaving a great part of the business to be done through distributive channels. Merchants report orders extremely numerous, but somewhat smaller than last month, the total tonnage being about the same. They are buying as little as possible, but in most lines a very fair tonnage is required to keep assorted stocks. The amount of business held up for lack of funds is becoming more evident, though the delay in many cases is considered only temporary.

Bars.—Merchants' specifications are coming out well, as stocks are moderate and require constant replenishing, though business from both merchants and manufacturers is limited to requirements of the immediate future. Small consumers also are buying with caution, but on the whole the jobbing movement is well maintained. The summer's tonnage of reinforcing material has been curtailed by delay in placing orders for construction projects requiring considerable quantities over an extended period, and the outlook for such business is poor. Local mills, however, are getting a very satisfactory tonnage for current construction, keeping their output well sold up, and considerable material is coming from Eastern mills. Soft steel bars in small lots, from store, are quoted at 2.75c., and iron at 2.65c.

Structural Material.—The tonnage from California in the last month has been heavy, but the bulk of the work in immediate prospect has now been disposed of, and it is difficult to forecast the future. In addition to the auditorium, the San Francisco city hall contract has been awarded to the United States Steel Products Company, its figure of $476,283 being over $55,000 below that of the lowest local bidder. The lowest bid on the Sather campanile was that of the California Construction Company, and the contract is reported let. Aside from this there is nothing of special importance in the market at present, though two Exposition jobs, a tower and the Fine Arts building, are expected shortly. Plans are said to be complete for pier 30, which will require a considerable tonnage of shapes, but the inquiry is held up indefinitely. Architectural arrangements are being made for the San Francisco library, but plans are not likely to be out this year. Buildings for which plans are about complete include the Y. M. I. building, a 7-story hotel in Oakland, and the Post-Bailey office building at San Diego. Plans are in the hands of architects for a number of large buildings, both here and at Los Angeles, but it is uncertain when they will be ready for figuring.

Rails.—Some small business of a routine nature is coming out, but on the whole the situation is dull. One good-sized purchase for an interurban line in the San Joaquin Valley is reported, but not verified, and aside from this no inquiries of importance are out at present. Most California railroads are buying what is urgently required, and while a few fair orders are

expected for the completion of lines now under construction, there is little prospect of new extensions being undertaken.

Sheets.—Galvanized sheets are still quiet, a number of jobbers having supplies considerably in excess of current needs. As there is normally a heavy demand for corrugated sheets in the third quarter, the stock is expected to clean up without difficulty, but there is little buying at present. Agents for the larger mills are maintaining prices steadily. Specifications continue to come out freely for other descriptions of sheets, the consuming demand for which shows little sign of abatement.

Plates.—The local demand is hardly as urgent as for some time past, though the tonnage shows little decrease. The outlook for new tank and penstock business of an important nature is a little uncertain, though there is still a fair movement on work already in progress. The Associated Oil Company is adding a number of large tanks to its plant near Martinez, Cal., and the Standard Oil Company is increasing its plant at El Segundo.

Merchant Pipe.—Some pipe is still coming in on old contracts and, while some merchants are specifying more liberally, a month or two more will be required to clean up the spring supply. Small business is fairly active all over the State, but there is no real replenishing of stocks anywhere, merchants being anxious only to keep full assortments. Orders for water and gas works, etc., have fallen off, and oilfield business is mostly of a small nature.

Cast Iron Pipe.—The San Francisco inquiry has not yet appeared, and nothing of any importance has developed in the last fortnight. Corporation business is confined to narrow limits, and while plans are ready for several municipal projects, most of them are delayed pending the sale of bonds. The town of Burlingame, Cal., is expected in the market next month, and the city of Stockton will hold a bond election in September to provide for a high-pressure water system.

Pig Iron.—The market is about at a standstill, purchases being only for pressing needs, which are comparatively light. With continued declines in the primary market price of Southern iron, and foreign material coming from several quarters, melters expect to have plenty of material available at easy prices during the fall, and are working their present supplies down as low as possible. The West Coast Iron Company expects to start its furnace in about two weeks, and has arrainged to market its product through the Robert Dollar Company. No. 1 Southern soft and Alabama Scotch, from store, are quoted at about $22.75, and Jarrow at $27 per gross ton.

Coke.—A good-sized steamer shipment of foreign coke has just arrived, being mostly sold prior to arrival. Prices on spot offerings are still fairly well maintained at $15 to $15.50 per net ton, but there is very little interest on the part of buyers. German Syndicate coke for fall loading is still quoted at $11.50 to $12 per gross ton.

Old Material.—There is hardly as much life to the market as in the recent past, purchases being fairly frequent but individually small, and while prices stand about as before there is a tendency to easiness. Local requirements, however, are considerably larger than in former years, and it is not expected that any unwieldy stocks will be accumulated. Prices are as follows: Cast iron scrap, per net ton, $17.50 to $18; steel melting scrap, per gross ton, $12; wrought scrap, per net ton, $13 to $15; rerolling rails, per net ton, $16.50.

Boston

BOSTON, MASS., July 1, 1913.

Old Material.—The market is almost lifeless, with not enough transactions to make quotations more than nominal. Dealers express the opinion that no improvement is to be looked for soon, despite the continued activity of the mills. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	$8.75 to	$9.00
Low phosphorus steel	13.50 to	14.50
Old steel axles	13.50 to	14.00
Old iron axles	21.00 to	21.50
Mixed shafting	13.00 to	13.25
No. 1 wrought and soft steel	10.25 to	10.50
Skeleton (bundled)	7.50 to	8.00
Wrought-iron pipe	8.50 to	9.00
Cotton ties (bundled)	8.50 to	9.00
No. 2 light	3.50 to	4.00
Wrought turnings	5.25 to	5.50
Cast borings	5.25 to	5.50
Machinery, cast	11.50 to	12.00
Malleable	10.00 to	10.50
Stove plate	7.75 to	8.25
Grate bars	6.75 to	7.00
Cast-iron carwheels	13.50 to	14.00

German Combinations Work Hard

Steel Bar Syndicate About Formed—Large Tube Syndicate Dropped, but Small Ones Effective

BERLIN, June 19, 1913.

Some reports claim that a slight improvement in bars is visible. Both home and foreign buying, it is said, have grown more active since prices dropped to the present low level. Somewhat better prices are even now reported as being paid for bars. According to a dispatch of to-day from Cologne the average price is now 103 to 104 marks for the home trade, though 100 marks was mentioned variously during the past fortnight as the lowest home price. There were even rumors on the Stock Exchange here to-day that the price of bars for the home trade had been lifted 5 marks, but this was of course an exaggeration. Some buying for the fourth quarter is mentioned. Bars for export are still as low as 98 to 99 marks, f.o.b. Antwerp.

With the Steel Works Union business in semi-finished steel and structural shapes is affected by the fact that the mills are taking stock for their yearly closing of accounts; but the activity in steel rails continues unabated. [A cablegram from Düsseldorf dated June 25 states that the Union has reduced the price of semi-finished steel $1.25 per ton and that a number of rolling mills have begun operating on reduced working hours. —Editor *The Iron Age.*]

In the Silesian district scrap is reported easier. Supplies have increased and the price position is somewhat weaker. The Siegen district reports pig iron quieter, consumers having contracted for the requirements for the second half year. Scrap is offered in considerable quantities, but the demand is slack and prices are weakening. Conditions in the plate trade are visibly growing worse under the increased production by the new mills, and it is predicted that plates will sooner or later reach the present plight of bars. Heavy plates are selling at 125 marks and lower, while in thin plates the position has so far deteriorated that some of the mills are running on short time.

The Trade Organizations

The trade is still much occupied with questions of organization. The combination of the tube mills broke down after all. The agreement to renew it and convert it into a syndicate finally came to nothing several days ago, owing to the fact that Thyssen demanded an increase of 80,000 tons in his allotment. As the total quantity that can be marketed is placed at 400,000 to 500,000 tons a year it was regarded by the other mills as quite out of the question to make so big an increase for one establishment. Under the circumstances the old price convention passes out of existence to-morrow. This will, however, not leave the tubing trade completely without an organization. Gelsenkirchen, Phönix, Thyssen and some of the smaller producers in the western section of the country will, it is understood, set up a common selling agency which had been projected some time ago. The Mannesmann concern at Düsseldorf, with its dependencies, will hold an independent position, but it is not believed that the two groups will open a price war on each other. The Silesian works will constitute a third group, which it is believed will effect a working arrangement with the first.

A plan for the bar syndicate has now been worked out after a week of strenuous labor, and it is to be taken up for serious discussion next week. All the works have meanwhile agreed to place certain restrictions on their sales till the end of July, in order to give leeway for completing the organization. A number of the important mills which formerly took no interest in efforts to organize the bar trade are now reported as actively participating in the present movement. The danger ahead, however, is again in the question of big allotment claims. The new establishments in the Luxemburg-Lorraine district—Gelsenkirchen, Thyssen and the

Burbach combination—it is understood are preparing to put in very large demands, and if they persist it is expected that the older establishments, like Krupps, Gutehoffnungshütte, Phönix and Stumm, will also demand bigger quotas. The banks are reported as taking a very active part in promoting the new organization, which is quite natural, as it would mean high dividends on iron shares. The stock exchanges have begun to build some hopes upon the probability of the organization being perfected.

The Belgian market sends in again its usual quota of price reductions. On Saturday the export price of all classes of plates was reduced 3s., while bands and all numbers and dimensions of bars were cut 2s. Yesterday reductions of 2s. were made in all kinds of semi-finished steel for export. The new prices are as follows: Blooms, 80s. to 82s.; billets, 82s. to 85s.; slabs, 85s. to 87s. At the same time the home price of heavy plates was lowered 5 frcs. and bars 2.50 frcs. From Austria comes news that the shipments of the Iron Kartell were considerably lighter in May than in April. The month's movement in bars, beams, heavy plates and rails was 51,100 tons, or 27,600 tons less than for May.

Buffalo

BUFFALO, N. Y., July 1, 1913.

Pig Iron.—Inquiry continues to come to producers at a lively rate, evidencing the fact that buyers are reaching a point where prompt attention will soon have to be given to ordering and are watching the market closely for the opportune time to secure low water mark prices. The volume of purchasing is already broadening, the tonnage placed the past week having been considerably larger than for some time, reaching a total of probably 20,000 tons or more, almost entirely of foundry grades and for third quarter delivery, with some extending over the fourth quarter. Most producers have set their minimum prices and are holding firmly to them, as with coke holding strong and the present high cost of ore they cannot afford to sell below that minimum. We quote as follows, f.o.b. Buffalo, for third and fourth quarter delivery:

No. 1 foundry	$14.50
No. 2 X foundry	$14.25 to 14.50
No. 2 plain	14.00 to 14.25
No. 3 foundry	14.00
Gray forge	14.00
Malleable	14.25 to 14.75
Basic	15.25 to 15.75
Charcoal	16.00 to 17.00

Old Material.—The week has shown considerable activity in borings and turnings, bundled sheet scrap and old steel axles, the low level in prices having apparently stimulated buying. Dealers state that more business is now being done than for some time and the majority of them incline to the opinion that bottom has been reached and that a general advance may be expected from now on. Some dealers have taken advantage of the low prices to increase their stocks. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$11.00 to $11.50
Boiler plate, sheared	13.00 to 13.75
Bundled sheet scrap	8.50 to 9.00
No. 1 busheling scrap	10.50 to 11.00
No. 2 busheling	8.00 to 8.50
Low phosphorus steel	16.50 to 17.00
Old iron rails	15.00 to 15.50
No. 1 railroad wrought	13.00 to 13.50
No. 1 railroad and machinery cast scrap	13.00 to 13.50
Old steel axles	17.00 to 17.50
Old iron axles	22.50 to 23.00
Old carwheels	13.00 to 13.50
Railroad malleable	12.50 to 12.75
Locomotive grate bars	10.00 to 10.50
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	9.50 to 10.00
Wrought iron and soft steel turnings	6.00 to 6.50
Clean cast borings	6.00 to 6.50
Bundled tin scrap	16.00

Finished Iron and Steel.—Specifications against contracts are coming in well and the pressure for deliveries, while easing up somewhat, is still strong. It is evident that material now being shipped from mills is going into actual consumption. Manufacturers and users of bars and finished steel products in general are reporting good business, and the selling agencies expect that a fair buying movement will set in by the middle or latter part of the current quarter. There has been no change in prices of bars, plates or structural material. Prices on cold rolled steel are now steady at 60 per cent. off for carload lots and about 55 per cent. discount for less than carloads. Railroad spikes have shown a slight softening in price, averaging about $1.75 base. Slight concessions are reported on galvanized sheets, business in which has fallen off slightly. Some large construction work on the Welland Canal in Canada is coming up for bids soon, requiring over 5000 tons of reinforcing bars, a large quantity of steel sheet piling and several thousand tons of structural steel. Bids for the first section of the work are to be taken about July 15. In fabricated structural material one local company reports the booking of over 3000 tons for the past month. The Lackawanna Bridge Company, Buffalo, has received contract for the steel work for the Buffalo plant of J. H. Williams & Co., Brooklyn, manufacturers of drop forgings, which will take about 800 tons. Bids have been taken on the Wilson & Smith eight-story store and loft building, Buffalo, which will require about 900 tons. Bids are to go in this week for the steel for an addition to the meat products plant of the Danahy Packing Company, Buffalo, requiring about 200 tons, and bids are also being taken for a theatre building at Olean, N. Y., to be erected by J. H. Havens, requiring about 100 tons.

British Market Less Depressed

Better Demand for Semi-Finished Steel —Good Quantities of Tin Plate Sold

(*By Cable*)

LONDON, ENGLAND, July 2, 1913.

The Balkan problem remains a very disturbing factor. The Cleveland pig-iron market is irregular. A better demand is felt for semi-finished steel and the German Steel Works Union talks of raising prices if it continues, especially as French and Belgian competition is abating. Some good quantities of tin plate have been sold for the East. Stocks of pig iron in Connal's stores are 214,178 tons against 218,682 tons a week ago. We quote as follows:

Cleveland pig-iron warrants (Tuesday) 55s. 2d., against 54s. 5d., a week ago.

No. 3 Cleveland pig iron, makers' price f.o.b. Middlesbrough, 56s., against 55s. a week ago.

Ferromanganese £11 12s. 3d., f.o.b. shipping port.

Steel sheet bars (Welsh) delivered at works in Swansea Valley, £5.

German sheet bars, f.o.b. Antwerp, 87s. 6d., a decline of 5s.

German 2-in. billets, f.o.b. Antwerp, 80s., a decline of 2s. 6d.

German basic steel bars, f.o.b. Antwerp, £4 16s., a decline of 2s.

French blooms, 77s. f.o.b. shipping port.

French sheet bars, 82s., 6d. f.o.b. shipping port.

Steel bars, export, f.o.b. Clyde, £7 10s.

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £6 15s.

German joists, f.o.b. Antwerp, £5 12s. to £5 15s.

Steel ship plates, Scotch, delivered local yards, £8 7s. 6d.

Steel black sheets, No. 28, export, f.o.b., Liverpool, £9 5s.

Steel rails, export, f.o.b. works port, £6 15s.

Tin plates, cokes, 14x20, 112 sheets, 108 lb., f.o.b. Wales, 13s. 6d.

New York

NEW YORK, July 2, 1913.

Pig Iron.—Apart from the malleable foundry contracts in New England, closed within the past ten days, there has been no great aggregate of pig iron buying in single large lots. One contract of 3000 tons of foundry iron has been closed in this market in the past week and the run of third quarter and second half buying from a variety of sources has put several hundred tons a day on the books of each of several selling firms. One malleable interest in Connecticut that bought 4000 tons in the early part of last week is believed to have closed with furnaces west of Buffalo. The delivered price was not much if any above $16. Something like 1000 tons of fairly prompt malleable was taken by the consolidation of malleable interests in Connecticut, but the buying for far forward delivery, which it was reported might be brought about by special inducements, has not materialized. Sales from Buffalo furnaces have not been heavy and the range of prices on foundry iron has been from $14 to $14.25 at furnace there for No. 2 X, more frequently the former than the latter figure. Pennsylvania furnaces have found more inquiry, but

prices show no improvement—rather the reverse. Another Pennsylvania furnace has gone out and the prospect is for some further curtailment. A New Jersey foundry has come into the market for considerable iron for the second half. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $16.25 to $16.75; No. 2 X, $15.75 to $16.25; No. 2 plain, $15.50 to $15.75. Southern iron is quoted at $16.50 to $16.75 for No. 1 foundry and $15.75 to $16 for No. 2.

Structural Material.—There is little activity in steel construction in this district. The absence of large inquiries is marked, though there are a good many small ones. A number of projects that have been before the market for some time have been settled the past week. Prominent among these is the contract for the Astor Apartments at Broadway and Seventy-sixth street, calling for 900 tons, awarded to Levering & Garrigues; also that for the Jersey Central pier shed at Communipaw, N. J., involving 1000 tons, which was given to the Gruber Engineering Company. The Canton Bridge Company was the successful bidder for the 200-ton bridge for the White River Junction Railroad in Vermont, while the New England Structural Company secured the contract for the addition to the State Mutual Building in Boston, which calls for 700 tons of steel. The Pennsylvania Railroad gave out a number of contracts for bridges the past week, which were distributed about as follows: four to the McClintic-Marshall Construction Company of 400, 150, 100 and 40 tons each; one to the Belmont Iron Works of 170 tons; one to L. F. Shoemaker & Co., 200 tons; one to the Eastern Steel Company, 100 tons, besides some smaller ones to the Pennsylvania and the Cambria steel companies. The contract for the 800 tons of steel for the Brooklyn plaza of the Manhattan bridge was secured by the Alfred E. Norton Company. The only new inquiry of importance coming up this week is one of about 1500 tons for a viaduct over the Navesink River for the New York & Long Branch Railroad, bids on which went in July 1. Shipments are becoming more prompt and prices of plain material remain at 1.45c., Pittsburgh, or 1.61c., New York. From store quotations are still at 2.10c. to 2.15c. for plain material.

Plates.—Prices for early delivery in this market are now announced to be at a 1.50c. Pittsburgh basis, or 1.66c., New York, whereas only recently 1.75c., New York, was quoted by Eastern mills. Some business on this lower basis has been done for several weeks, but now this price is general. Orders are reported by some interests as being more active as a consequence, though there are no large bookings. Consumers are not anxious to renew contracts for the last half and very few have done so. There is practically no inquiry on the part of the railroads for cars. A report that the Great Northern is in the market for 1000 cars cannot be confirmed. The Pressed Steel Car Company was the successful bidder for 65 coke and 25 flat cars for the Bethlehem Steel Company. Quite prompt deliveries can now be made. Export business is good at 1.56c., New York. We quote 1.50c., Pittsburgh, or 1.66c., New York, for delivery in ten days to two weeks, and 1.45c., Pittsburgh, or 1.61c., New York, for mill shipment in the last half.

Bars.—The situation is reported good, with a fair amount of inquiries and orders. Mills in general are busy with contracts extending well into the fall. Good crops are expected to create a demand that will be felt later on, so that there is no pessimism apparent. There is no weakening in prices, which still range from 1.50c. to $1 or $2 a ton higher, depending on conditions. We quote bar iron at 1.60c. to 1.65c., New York, and steel bars at 1.56c., New York. Store prices continue at 2c. to 2.05c. for steel bars and 2.05c. to 2.10c for iron bars. Jobbers' stocks have been drawn down considerably by the prompt business of the past two months.

Cast-Iron Pipe.—The city of New York is purchasing more cast-iron pipe than had been made public at the time of going to press last week. Bids were opened yesterday on 600 tons for the requirements of the borough of Manhattan and on a contractor's job for Manhattan which will take 750 tons. To-day the bids will be opened on proposals by contractors for the extension of the Manhattan high pressure fire prevention service which will involve about 11,000 tons, and direct bids will be opened for 2000 tons of pipe for Brooklyn and a contractor's job for Brooklyn which will take 850 tons. Bids will also be opened to-day on the furnishing of 1050 tons direct to the borough of Queens and to-morrow bids will be opened on 250 tons for the borough of Richmond. No further public lettings of any consequence have developed in this immediate vicinity. Private buying, however, is going on at about the same rate as recently. Prices of carload lots of 6 in. are $23 to $24 per net ton, tidewater, New York.

Old Material.—Dealers report little or no buying. Some classes of scrap are so completely neglected that their use seems to have gone out of fashion. Steel companies are not in the market, and the best that can be heard with regard to any buying in this direction is that some say they will probably do so in August. Rolling mills appear to be in no need of anything and foundries are taking but little cast scrap. With practically no demand, railroads and other makers of scrap are offering large additional quantities to dealers, so that the market is further glutted. Under the circumstances, prices display no strength and some have declined considerably. Dealers quote as follows, per gross ton, New York:

Old girder and T rails for melting	$8.50 to	$9.00
Heavy melting steel scrap	8.50 to	9.00
Relaying rails	21.50 to	22.00
Rerolling rails (nominal)	12.00 to	12.50
Iron car axles	20.50 to	21.00
Steel car axles	14.00 to	14.50
No. 1 railroad wrought	11.25 to	11.75
Wrought iron track scrap	10.50 to	11.00
No. 1 yard wrought, long	10.00 to	10.50
No. 1 yard wrought, short	9.50 to	10.00
Light iron	4.00 to	4.50
Cast borings	5.00 to	5.25
Wrought turnings	4.25 to	4.50
Wrought pipe	8.25 to	8.75
Carwheels (nominal)	12.00 to	12.50
No. 1 heavy cast, broken up	10.25 to	10.75
Stove plate (nominal)	8.00 to	8.25
Locomotive grate bars	7.00 to	7.50
Malleable cast	8.50 to	9.00

Ferroalloys.—The makers' price of 80 per cent. ferromanganese continues at $61, Baltimore, but a few carload lots for prompt delivery have been sold by merchants at or near $60. In the market are inquiries for 500 to 600 tons for forward delivery, in lots ranging from 300 tons down. Consumers are pressing for deliveries against their contracts, and it is believed that they would enter the market with good inquiries were it not for the prospect of ferromanganese going on the free list when the proposed tariff schedule becomes law. Ferrosilicon, 50 per cent., is unchanged at $75 for carloads, $74 for 100 tons and $73 for 600 tons and over.

Metal Market

NEW YORK, July 2, 1913.

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead		Spelter	
June	Lake.	Electrolytic,	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
26	15.00	14.50	43.60	4.35	4.22½	5.15	5.05
27	15.00	14.62½	42.65	4.35	4.22½	5.25	5.10
28	15.00	14.62½	.....	4.35	4.22½	5.30	5.15
30	15.00	14.62½	42.50	4.35	4.22½	5.30	5.15
July							
1	15.00	14.62½	41.60	4.35	4.22½	5.30	5.15
2	15.00	14.62½	41.75	4.35	4.22½	5.30	5.15

Copper is inactive and prices are nominal. Tin is lower and buying has been of small proportions. Lead is quiet at unchanged prices. Spelter is higher, following a short period of buying. Antimony is lower and neglected.

New York

Copper.—The market has been dull and prices are entirely nominal. There has been no pressure to sell or anxiety to buy; in fact, conditions are practically at a standstill. One reason for the situation is that consumers are well supplied with metal for July and are disinclined to load up further in view of the falling off in new business that is being received by them. The copper they are now using was bought at figures considerably higher than those now quoted or at which copper could be procured to-day. Quotations are 15c. for Lake and 14.62½c. for electrolytic. These are resale prices and it is understood that the large agencies are asking a few points more. In the week prices of 14 and 16 oz. hot rolled sheet copper were reduced 1c. per lb. Copper was quoted in London to-day at £63 18s. 9d. for spot and £64 2s 6d. for futures. June exports were 27,815 tons. The tendency of prices abroad as well as here was toward weakness.

Copper Averages.—The Waterbury average for June was 15.37½c. The average New York price for Lake, based on daily quotations in *The Iron Age*, was 15.42c., and for electrolytic, 14.81½c.

Pig Tin.—This metal has been dull so far as large purchasing is concerned, but the much lower prices which the week brought caused a fair demand for small lots on the part of consumers who needed only a few tons and took advantage of the slump. The erratic course of the market has continued in London, and quotations there dropped £4 5s. yesterday. Tin is

quoted in New York to-day at 41.75c. The low price is not inducing much business for practically the same reasons that exist in copper, the consumers being well supplied for the present, while new business has fallen off. Incidentally the metal they are now using cost 48c. or higher and much more of it is to be delivered. The severe declines abroad are taken to mean that the metal is weak there, although the June world statistics are regarded as favorable. The total visible supply June 30, 1913, was 11,101 tons, or 1819 tons less than that of June 30, 1912. Deliveries into domestic consumption in June were good, amounting to 3800 tons. The total deliveries for six months show a decrease of 550 tons as compared with the same time last year. In London to-day quotations were £190 5s. for spot and £190 10s. for futures. Arrivals this month total 740 tons, and there is afloat 1767 tons.

Lead.—With demand very light the market is nevertheless firm with quotations at 4.35c., New York, and 4.22½c., St. Louis.

Spelter.—The good inquiry which recently developed resulted in a fair amount of activity in which more spelter was sold than in five or six weeks previously. One result was the hardening of prices, and to-day 5.30c., New York, and 5.15c., St. Louis, are quoted. The demand is not entirely satisfied and the market is firm, with a disposition on the part of some producers to wait for a better price. Most of the requirements are for future delivery.

Antimony.—Despite slightly lower prices all brands continue dull and neglected. The import cost of Hallett's is 8.25c., but it can be bought ex-warehouse at 8c. Cookson's is quoted at 8.50c. to 8.60c., and Chinese and Hungarian grades are held at 7.50c. to 7.60c.

Old Metals.—The market continues weak. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible	14.00 to 14.25
Copper, heavy and wire	13.50 to 14.00
Copper, light and bottoms	12.50 to 13.00
Brass, heavy	8.75 to 9.00
Brass, light	7.50 to 7.75
Heavy machine composition	12.75 to 13.00
Clean brass turnings	8.50 to 8.75
Compostion turnings	11.25 to 11.75
Lead, heavy	4.25
Lead, tea	4.00
Zinc, scrap	3.85

Chicago

JUNE 30.—The tendency in copper quotations appears to be toward higher values. Tin quotations have fluctuated sharply, but with no net change. Spelter is being quoted higher in some quarters, but new low prices for zinc are announced. We quote as follows: Casting copper, 15c.; Lake, 15.25c., in carloads for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 44c.; small lots, 46c.; lead, desilverized, 4.35c. to 4.40c.; corroding, 4.60c. to 4.65c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.10c. to 5.15c.; Cookson's antimony, 10.50c., and other grades, 9.75c., in small lots; sheet zinc is $7, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than coarload lots: Copper wire, crucible shapes, 12.50c.; copper bottoms, 11.75c.; copper clips, 12.75c.; red brass, 12c.; yellow brass, 8.50c.; lead pipe, 3.50c.; zinc, 3.75c.; pewter, No. 1, 32c.; tinfoil, 32c.; block tin pipe, 39c.

St. Louis

JUNE 30.—The past week there has been but little activity. Lead closed the week at 4.22½c. to 4.25c.; spelter, 5c.; Lake copper, 15.22½c. to 15.60c.; electrolytic copper, 15.10c. to 15.35c.; tin, 42.85c. to 43.10c.; antimony, Cookson's, 9c. to 9.10c. In the Joplin ore market zinc blende was stronger, and not only were offerings of buyers 50c. to $1 per ton better but the demand was much more brisk. The basis price for 60 per cent. grades was $40 to $43.50 per ton, while choice ores commanded up to $46. Low grade ores sold as low as $35. Calamine brought $20 to $21 on the basis of 40 per cent., while the choicer grades brought as high as $25. Lead ore was unchanged at $52.50. We quote miscellaneous scrap as follows: Light brass, 5.50c.; heavy brass and light copper, 9.50c.; heavy copper and copper wire, 11c.; tinfoil, 34c.; pewter, 25c.; lead, 3.50c.; zinc, 3c.; tea lead, 3c.

At a conference held in Youngstown, Ohio, on Thursday, June 26, between representatives of the union molders and Youngstown foundry operators, the scale of wages for molders was fixed at $3.75 per day, minimum, for nine hours.

Iron and Industrial Stocks

NEW YORK, July 2, 1913.

The stock market has been dull, but with prices a little stronger. The settlement of the long controversy over the terms of the dissolution of the Union-Southern Pacific merger was looked upon as overcoming one more of the unfavorable influences that have dominated the stock market in recent months. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Am. Can, com.	26 - 28½	Rumely Co., pref.	36 - 42
Am. Can, pref.	86½ - 87¾	Sloss, com.	24 - 24½
Am. Car & Fdy., com.	41½ - 43	Pipe, com.	9⅝ - 10⅛
Am. Car & Fdy., pref.	109 - 109½	Pipe, pref.	48⅛
Am. Steel Foundries	25	U. S. Steel, com.	51⅞ - 53⅜
Bald. Loco., com.	40	U. S. Steel, pref.	102⅜ - 104¼
Bald. Loco., pref.	100¼ - 100¾	Va. I. C. & Coke	40
Beth. Steel, com.	27⅞ - 28	Westinghouse Elec.	58½ - 59¾
Beth. Steel, pref.	65¼ - 66¼	Am. Ship, com.	42½ - 45
Colorado Fuel	26⅞ - 28	Chic. Pneu. Tool.	48¼ - 49½
Beere & Co., pref.	95 - 95¼	Cambria Steel	43⅛ - 44
General Electric	135½ - 136½	Lake Sup. Corp.	23¾ - 24¼
Gr. N. Ore Cert.	32¾ - 34¾	Pa. Steel, pref.	66
Int. Harv., com.	102¾ - 103½	Warwick	10
Int. Harv., Corp.	102½ - 103¾	Crucible Steel, com.	13¼ - 13¾
Pressed Steel, com.	23 - 23½	Crucible Steel, pref.	86½ - 86⅞
Pressed Steel, pref.	90⅛ - 92	Harb. Walk Ref., com.	45
Railway Spring, com.	23⅜ - 24¾	Harb. Walk Ref., pref.	101
Republic, com.	18 - 19½	La Belle Iron, com.	43½ - 47⅞
Republic, pref.	74¾ - 75½	La Belle Iron, pref.	119⅜ - 120
Rumely Co., Com.	17 - 20		

Dividends Declared

The Yale & Towne Mfg. Company, regular quarterly, 1½ per cent. and extra dividend of 1 per cent., payable July 1. Subscribers to new stock, not full paid, will be entitled to dividends pro rata to their payments made on or before May 10.

The American Seeding Machine Company, regular quarterly, 1½ per cent. on the preferred and 1 per cent. on the common stock, payable July 15.

The Pittsburgh Coal Company, regular quarterly, 1¼ per cent. on the preferred stock, payable July 25.

The American Shipbuilding Company, regular quarterly, 1¾ per cent. on the preferred stock, payable July 15.

The E. W. Bliss Company, regular quarterly, 2 per cent. on the preferred stock, payable July 1.

The Canadian Car & Foundry Company, regular quarterly, 1¾ per cent. on the preferred stock, payable July 25.

The National Fireproofing Company, regular quarterly, 1 per cent. on the preferred stock, payable July 15.

The Nova Scotia Steel & Coal Company, Ltd., regular quarterly, 1½ per cent. on the common stock and 2 per cent. on the preferred stock, both payable July 15.

The Wheeling Steel Casting Company, Wheeling, W. Va., which was formerly the Alloy Steel Casting Company, is enlarging its plant at Warwood, near that city, and installing new machinery. It is building a 15-ton acid open-hearth steel furnace and will make steel castings exclusively, up to 20 tons in weight. It is expected to have the enlarged plant in operation by September 1. C. H. Dowler is president and general manager; S. M. Noyes is secretary and treasurer, and C. B. Collingwood is superintendent.

To provide better facilities for handling the large stock carried in San Francisco, the United States Steel Products Company is putting up two concrete warehouses, costing respectively $150,000 and $65,000, on its property at the foot of Twentieth street.

A recent report puts the imports of iron and steel into Japan in 1912 at about $28,643,560, an increase of $8,200,000 over 1911. Of the total, 90 per cent. consisted of pig iron, ingots, bars, rods, pipes and tubes.

The Massillon Rolling Mill Company, Massillon, Ohio, has signed the sheet mill scale of the Amalgamated Association, effective from July 1.

The Schaw-Batcher Company is building a new warehouse for its wholesale steel business at Sacramento, Cal.

The Maryland Steel Company blew out its C furnace at Sparrows Point, Md., June 12, for complete rebuilding. Furnace B was blown in June 8, making three of the four furnaces active July 1.

Personal

George H. Abeel, manager of the Old Range mines of Oglebay, Norton & Co., with headquarters at Ironwood, Mich., has resigned after an association with that firm extending through 26 years. The development of the Montreal mine into a large property and the introduction of the latest practice into its equipment and operation are coincident with Mr. Abeel's management. In addition to a direct supervision of the Gogebic range mines he exercised an advisory management of the Mesaba range properties of his company. Mr. Abeel is one of the most prominent of the members of the Lake Superior Mining Institute, having been its president and for many years one of the board of managers. Succeeding Mr. Abeel, F. B. Goodman will manage the Montreal Mining Company properties; P. S. Williams, the Castile Mining Company group, and A. Angst, the mines at Buhl, Minn.

I. Mhyre Hofstad, St. Petersburg, Alaska, has been appointed agent for that territory for the Blanchard Machine Company, Cambridge, Mass., manufacturer of oil engines, marine and stationary, 8 to 100 hp.

Chairman E. H. Gary, of the United States Steel Corporation, sailed for Europe on the Mauretania July 2.

Ernst Boley, of the American Steel & Wire Company, Cleveland, sailed this week for a European trip, including Germany and Norway.

As a result of the recent death of E. Y. Swift, for many years president of the Michigan Bolt & Nut Works, Detroit, Mich., some changes have been made and the present executive officers are as follows: L. L. Barbour, president; F. S. Bigler, vice-president and general manager, and H. MacLean, secretary and treasurer.

Prof. Hugo Diemer, head of the department of industrial engineering, Pennsylvania State College, has received the degree of bachelor of arts in history, political science and economics from that institution. For a number of years he has taken an active interest in economics and the educational phases of engineering and has contributed to the literature of these fields.

J. B. Bartholomew, formerly connected with the Bethlehem Steel Company at its Chicago office, and later with the Rochester Bridge Company, Rochester, N. Y., has become associated with the Chicago Steel Products Company as sales engineer.

George Whiting, founder of the George Whiting Company, Elston avenue, Chicago, manufacturer of punches and shears, is convalescing rapidly from an operation for appendicitis.

H. W. Williams, for two years manager of the Pittsburgh office of the Electric Controller & Mfg. Company, Cleveland, Ohio, has been made manager of the Chicago office of the company, effective from July 1, to succeed W. M. Connely, formerly Chicago representative, who has resigned.

H. E. Dickerman, sales agent for the Chisholm & Moore Mfg. Company, Cleveland, Ohio, sailed for Europe June 28 on a business trip of six weeks.

In the Goslar district of Germany, drills recently made of hard electric furnace steel for boring machines have shown unusual results. Besides an increased output in mining the drills have brought about a marked reduction in replacements, as well as in the number of drills requiring sharpening.

Lockwood, Greene & Co., architects and engineers for industrial plants, 60 Federal street, Boston, have removed their New York offices from 320 Fifth avenue to the Architects' Building, 101 Park avenue. The New York representatives are Frank A. Wing and John M. Toucey.

Notice has been given by the Garland Corporation, Pittsburgh, that the Fidelity Title & Trust Company, trustee, would, on July 1, pay for and retire $50,000 of the first mortgage bonds of that corporation. Interest on the bonds thus retired ceased July 1.

Obituary

James Nelson Vance

James N. Vance, a leading business man of Wheeling, W. Va., died at his home in that city June 25 of heart failure in his 84th year. He was a native of the Wheeling district, and his entire business life was spent there. Starting with a public school education, his first business connection was in 1853 in the retail iron and hardware business. In 1861 he was one of the founders of the firm of Dewey, Vance & Co., which erected a plant at Benwood, to make railroad spikes and other iron products. In 1866 a second plant was erected and in 1872 another and larger plant was built, embracing cut nail works, pipe and skelp mills. In 1875 William M. Hearne, father of Frank J. Hearne, was admitted to the firm, which was then incorporated under the name of the Riverside Iron Works, of which Mr. Vance was president and Nathan Wilson secretary and treasurer. The business of the Riverside Iron Works in the manufacture of Bessemer steel, pipe, nails and other products expanded rapidly. In 1899 it was taken over by the National Tube Company, at which time he retired. He was president of the National Exchange Bank, Security Trust Company, Imperial Glass Company, Wheeling Bridge Company and Franklin Insurance Company. He was also a director in the Fostoria Glass Company, United States Stamping Works, State Bank of Elm Grove; the Woodward Iron Company, Birmingham, Ala.; Wheeling Sheet & Tin Plate Company, Federal Trust & Savings Bank of Chicago, and for several years was extensively interested in Chicago real estate.

Mr. Vance was a devout Presbyterian and several years ago erected one of the most beautiful churches in West Virginia at Woodlawn, the edifice being built near the spot where he was born, as a memorial to his father and mother. It is known as the Vance Memorial Church. Known everywhere as an open-hearted philanthropist, he donated liberally to all worthy causes and through his substantial donation the building of Wheeling's handsome Y. M. C. A. was made possible. His wife died two years ago. His surviving children are Henry E. Vance, Wheeling; James Newton Vance, Jr., New York; William N. Vance, Colorado Springs, Colo., and Mrs. S. W. Harper, Wheeling.

HOWARD HARLAN DICKEY, Cumberland, Md., died June 25, aged 41 years. He was born in Oxford, Pa., and received his education in the West Penn Academy and University of Pennsylvania. In 1892 he went to Cumberland with his father, who had purchased the Crown & Cumberland Steels Works, and assisted in the management of the plant which subsequently engaged in the manufacture of tin plate. In 1898 he secured a contract from the Government for the manufacture of projectiles which were used in the Spanish-American war. On the death of his father the management of the entire plant devolved upon the son. He subsequently sold a portion of it to the American Sheet & Tin Plate Company and the remainder to the Crucible Steel Company of America, of which latter corporation he was elected a director. In 1901 he bought back from the Crucible Steel Company the plant he had sold and organized the Maryland Sheet & Steel Company. One year later he re-purchased the other portion of the plant from the American Sheet & Tin Plate Company and organized the Maryland Rail Company. He then sold the plant to the N. & G. Taylor Company, Philadelphia. Securing a lease of the old Baltimore & Ohio Rolling Mill, he organized the United States Rail Company, of which he was president at the time of his death. He leaves a widow and six children.

JOSIAH LETCHWORTH, treasurer of the Pratt & Letchworth Company, Buffalo, N. Y., died at his summer home at Glenwood, on Lake Owasco, June 30, aged 77 years. He became identified with the company named, now an important concern engaged in the manufacture of malleable iron and steel castings, in the early years of its development and for a long period was active in its management. In the past 10 years, however, although he retained his interest and official position, he had retired from participation in the direction of the affairs of the company except in an advisory manner.

Pittsburgh and Vicinity Business Notes

The Pittsburgh office of the Allis-Chalmers Mfg. Company, J. Weidman Murray, manager, has received an order from the Carnegie Steel Company for a 30 x 56 x 54 in. cross compound engine to be direct connected to gear drive for the operation of an 18-in. sheet-bar mill in the works at Mingo Junction, Ohio. Specifications require that the engine shall weigh 750,000 lb. In operation the engine is to be under manual control by throttle under all speeds up to 85 r.p.m., under which condition the length of cut-off shall be under control of the engineer, allowing its manual regulation from 0 to ¾ stroke; at or above 85 r.p.m., the engine shall automatically come under the control of a speed limit governor, which will then control the cutoff from 0 to ¾ stroke. The engine is to be equipped with a backing-up device for removing a piece out of the rolls when necessary.

A number of members have made application to the Engineers' Society of Western Pennsylvania, Pittsburgh, for the formation of a metallurgical and mining section in accordance with a provision in the by-laws under which mechanical and structural sections were formed some time ago. Vote on the formation of the section will be had at the regular meeting to be held September 16. The society now has a total membership of 1135, of whom 986 are active members. There is only one local engineering society in the country exceeding this membership.

On Saturday, June 28, the new and handsome brick station house at the station to be known as Mesta, erected at West Homestead on the Pennsylvania Railroad, was formally dedicated. It was built mainly for the convenience of employees of the Mesta Machine Company, whose large works are located there. Addresses were made by S. C. Long, general manager of the Pennsylvania Railroad; George Mesta, president of the Mesta Machine Company, and others, after which a luncheon was served in the dining rooms of the company. This was followed by an inspection of the Mesta plant, which is being operated to its capacity, with work ahead for some months. Included in work on the floor are castings for several large blowing engines for the Broken Hill Proprietary Company for driving its new blast furnace now being erected in Australia.

Recommendation has been made by United States engineers that orders be placed for power plant building and equipment for dams Nos. 7 and 9 on the Ohio river to the lowest bidders, as follows: H. L. Kreusler, Pittsburgh, building for dam No. 7, $22,310, dam No. 9, $26,201; Heine Safety Boiler Company, two boilers, $3000 each; Reineke-Wagner Pump & Supply Company, feed water pumps at $72 and $67, and service pumps, $935 and $900; Dravo-Doyle Company, feed water heaters, $273.80 and $263.80; Hall Steam Pump Company, air compressors and receivers, two at $2883 each; Moss & Blakely, piping, $2795 for each installation.

The Erie City Iron Works, Erie, Pa., through its Pittsburgh office has sold to the Jamison Coal & Coke Company a 400 h.p. Erie City water-tube boiler to be installed in its works at Barrettsville, W. Va.

The Charles N. Hays Company, First National Bank Building, Pittsburgh, has taken a contract for additions to the power plant of the Armstrong Cork Company, Pittsburgh, which includes raising the floor of the boiler room 4 ft., to place it above flood line; the installation of two 400 h.p. Babcock & Wilcox water-tube boilers, to be operated by Playford chain grates manufactured by the Rosedale Foundry & Machine Company, Pittsburgh; two 10 x 6 x 18-in. Canton-Hughes boiler feed pumps; a complete new system of steam piping; complete coal and ash handling system, and the erection of a 200-ft. stack, 10 ft. in diameter.

The Shenango Furnace Company, Pittsburgh, of which W. P. Snyder is president, has decided to erect by-product coke ovens at its furnace plant at Sharpsville, Pa. The company operates three blast furnaces, and the by-product coke plant will be of sufficient size to make 30,000 to 35,000 tons of coke per month, which is about their requirements.

The William Tod Company, Youngstown, Ohio, has about completed a 44-in. blooming mill, weighing 1,275,000 lb., for the new open hearth steel plant of the Youngstown Sheet & Tube Company, Youngstown, Ohio. It is large enough to roll and edge a steel slab 42 in. wide, and will be driven by an engine built by the Mesta Machine Company, Pittsburgh. The William Tod Company is building a similar blooming mill, with engine equipment, and a 24-in. merchant mill for the Brier Hill Steel Company. The engine is a twin tandem compound of new design, developing 25,000 h.p.

The board of directors of the Youngstown Sheet & Tube Company, Youngstown, Ohio, has authorized the building of a works office on the south side of the river at its plant at East Youngstown, to cost about $200,000. The company will also build a laboratory and first aid hospital to cost about $100,000, but these buildings will be disconnected from the office building.

New Blast Furnace for Sweden.—A powerful syndicate is reported to be about to erect a large blast furnace, coke ovens and electrical plant in Sweden at a cost of $2,000,000 to $2,250,000. It is to be located south of Stockholm, at the end of the Oxelösund-Flen Railroad. The furnace is to turn out 80,000 tons of pig iron per year and the coke ovens are to produce 40,000 tons of coke in excess of the needs of the blast furnace, which will be available for the general market. It is estimated that 140,000 tons of iron ore will annually be needed for this plant, which will come from the Grängesberg ore fields. The electrical plant is to supply current for transmission over long distances.

Actual construction of the 10 new mills at the Weirton plant of the Phillips Sheet & Tin Plate Company, Weirton, W. Va., will be begun early in the fall, according to E. T. Weir, general manager. The cost of the improvements will be $1,000,000, and employment will be given to 800 more men, bringing the total working force at the plant up to 2400 men. The Weirton Development Company, an affiliated interest, has purchased 20 acres of land and has awarded the contract for erecting 20 five-room frame dwellings at an average cost of $1000. Finishing touches are also being given 24 five-room houses erected by the company east of the plant. The West Penn Traction Company is running a power line from Brilliant, Ohio, to Weirton, and thence to Burgettstown, Pa., where it has a 10-year contract for street illumination. At Weirton the company will furnish power for the Weirton Steel Company.

With the letting of the contract for the Palace of Mines June 25, the last of nine main exhibit buildings for the Panama-Pacific Exposition at San Francisco has been disposed of. There remain but four other structures of importance to be placed under contract, and the architectural plans for these have been completed and the structural plans will shortly be finished. The Machinery Building, on which work was begun January 1, is now more than 90 per cent. completed. All the buildings under contract are to be completed within seven months.

The McCue Company, manufacturer of automobile axles and forgings, Buffalo, N. Y., is adding 30,000 to 40,000 sq. ft. of floor space to its plant for the purpose of taking care of its rapidly increasing wire wheel business. A considerable amount of new machinery has already been purchased to be used in the manufacture of wire wheels for automobiles. It has recently opened its drop forge plant, which is claimed to be among the best equipped in the country. The expenditure in extensions and equipment amounts to about $65,000.

A treatise on wire annealing has been issued by Ed. Brand, specialist in wire machinery, 96 Victoria street, London, S. W., England. It describes the Lammine welded wrought steel pots for annealing wire, manufactured under the patents of Th. Lammine, Mulheim, Germany. These pots are made from steel plate, cold rolled into tube shape and the edges welded, thus avoiding riveted seams.

The Chattanooga Iron & Coal Company, Chattanooga, Tenn., blew out its blast furnace Monday, June 30.

Revision of the Specifications for Steel

(Continued from page 29)

committee, was chosen to succeed Mr. Webster. A. A. Stevenson, Standard Steel Works, Philadelphia, resigned as first vice-chairman of the committee and Edgar Marburg as secretary. John A. Capp, chief of the testing laboratory of the General Electric Company, Schenectady, N. Y., was chosen to succeed Mr. Stevenson; G. Aertsen, Midvale Steel Company, Philadelphia, was elected second vice-chairman, and C. L. Warwick, University of Pennsylvania, Philadelphia, secretary. In connection with a vote of the society's thanks to Committee A-1 for its great service, several members spoke in commendation of the record of its retiring chairman and vice-chairman.

Preservative Coatings

The second session on Tuesday, June 24, at 3 P. M., was devoted to corrosion and preservative coatings, and the subject was introduced by the report of Committee D-1 on preservative coatings for structural materials, presented by Percy H. Walker, chairman. The portions of special interest from this rather extended report are those on the inspection of the Havre de Grace bridge and on the Atlantic City paint tests on steel plates. The former dealt with the inspections made during the past year of the panels and plates on this bridge which in 1906 were coated with 19 various paint preservatives furnished by competing manufacturers. The inspection the past year has been made by representatives of the various railroads as well as by members of the society and the findings are averaged in a table which shows the uniform superiority of several grades of paint, a superiority that has been maintained by two or three paints throughout the several years. In the very brief discussion that followed this report, a representative of one of the firms that furnished the paints moved that each of such firms be represented on the sub-committee on this subject without giving them a voice in its proceedings. The object of this was to afford each firm the means of knowing how its particular paints ranked, since this information has been carefully guarded by the committee. The matter was referred to the executive committee.

The report of the sub-committee on the Atlantic City paint tests on steel plates gave the results of the inspections made April 1, 1912, and April 16, 1913, and these were averaged with those of previous years. The object of these tests is to learn whether certain single pigments would, when enveloped in oil film, offer the same relation to the protection or to the corrosion of iron or steel that was exhibited by these pigments in laboratory tests when placed in contact with steel plates in the presence of water. It is interesting to note how some pigments have ranked high up to the past year and have then fallen down or been discarded, whereas one or two pigments still maintain a lead, one in particular, American vermilion (chrome scarlet), having been accorded first place from the beginning. It was stated that these plates had been necessarily removed recently to a favorable location on Young's Pier because of building operations in the old location.

Rate of Corrosion of Metals

A. W. Carpenter presented a paper on "The Rate of Corrosion of Metals," which gave results to date of the second and third series of corrosion tests described in the same author's paper published in the Proceedings of the Society for 1911, Vol. XI, p. 622. The object of the tests is to ascertain the effect as to corrosion of locomotive gases in tunnels on certain coated and uncoated metals. The paper should be consulted to secure a knowledge of the results thus far, since final conclusions are not reached and further tests are still to be made. In the discussion Dr. A. S. Cushman deprecated the unreliability of data obtained by loss in weight of plates in which segregation and scale cause varying conditions in different portions, this being the method used in the tests described.

A paper by E. W. Boughton on "The Testing of Chinese Wood Oil" brought forth more discussion than any other of the session and it was commended as containing much valuable information on a subject in which all producers of preservative paints are becoming more and more interested. It was stated that lately this oil had been found of great value in producing an efficient preservative paint for steel and iron.

The session closed with a short paper by M. McNaughton dealing with the protective value of a paint coat applied above or below a coat of other paint, the author's idea being that the best protection against the corrosion of iron or steel is to be secured not by the use of any one kind of paint, but by the use of different kinds in combination; also that better comparative results can be obtained if various portions of the same plate are covered with different paint combinations. The plates were exhibited at the meeting, but conclusions were not given, since the tests were not made under the authority of the society.

Heat Treatment of Steel

The annual address of the president, Robert W. Hunt, on Tuesday evening, June 24 (as given in last week's issue), was enthusiastically received by a large audience. It was followed by the report of Committee A-4 on the heat treatment of iron and steel, presented by the secretary, J. H. Hall, in the absence of Albert Sauveur, the chairman. It recommended practice for the heat treatment of case-hardened carbon steel objects and brought out no comments.

The remainder of the evening's session was devoted more or less informally to heat treatment, with special reference to the effect on physical properties of the size of section. Two papers bearing directly on this subject were presented, one by J. H. Nead, H. H. Franklin Mfg. Company, Syracuse, N. Y., on the "Effect of Size of Section on the Physical Properties Developed by Heat Treatment," and the other by K. W. Zimmerschied, General Motors Company, Detroit, on the "Influence of Mass in the Heat Treatment of Steel." Mr. Nead in his interesting paper emphasized the fact that though we have a large amount of data regarding the physical properties of all kinds of alloy steels under varying conditions of heat treatment, etc., such data are obtained from testing standard tension test pieces that have been heat treated either in the test piece size or as ⅞ or 1-in. round bars, subsequently machined to standard tension test piece size. In no case do we have any real knowledge of the actual properties of these materials in larger sections as actually used in service after heat treatment. The author stated that very little work has been done on the effect of the size of section on physical properties and that its importance was great in view of the fact that automobile designers and others should know what physical properties may be expected from sections of different size, differently heat treated. So it was with a view of obtaining some definite information on this point that experiments were made.

Briefly the plan consisted in actually testing in full size test pieces from ½ in. round up to 1¾ in. round, the diameter increasing ⅛ in. from piece to piece. Chrome-vanadium steel was used in one series of tests and nickel steel in the other series, extreme care being taken in the selection and analysis. These steels were carefully heat treated in such a way that the size of the piece should be the only variable. The majority of the tests, all the threaded ones, were pulled in the 800,000-lb. Emery testing machine at the Watertown Arsenal, Watertown, Mass. The results of the tests showed that there was a falling off in the maximum strength of 85,000 lb. per sq. in. from the ½ to the 1¾-in. test pieces—from 260,000 to 174,000 lb. per sq. in., or 33 per cent., in the chrome-vanadium steels. In these same steels the elastic limit showed a greater decrease from the small to the large sections—i. e., from 219,000 to 126,000 lb. per sq. in., or 42.5 per cent. The reduction of area and the elongation were found to increase from the smaller to the larger sizes; the increase in the reduction of area was about 28 per cent. for the smaller and about 35 per cent. for the larger, whereas in the elongation the increase was about 4 per cent. for the smaller sizes and about 15 per cent. for the larger. The tests of the nickel steel sections were not as satisfactory or consistent as the chrome-vanadium and the disparity is explained as due to the rather unfortunate circumstance that the nickel steel selected was of a low carbon content, thus depreciating the tendency to harden when quenched.

The paper by Mr. Zimmerschied was frankly acknowledged to be fragmentary. It consisted in comparing the physical properties of pieces of steel of 1 in. and ½ in. area as well as the core of a 1 in. area machined

down to ½ in. area, all heat treated the same. The bar from the core was found to have decidedly better physical properties throughout than those of the whole section, which was regarded as contrary to expectations.

The two papers aroused considerable informal discussion, participated in by Henry D. Hibbard, Bradley Stoughton, R. P. Devries, William R. Webster, A. A. Stevenson, John S. Unger and others. The general trend was to the effect that valuable as was the information in these papers, considerably more data were required to form an intelligent conception of this important subject, and tests of larger sections up to 8 or 10 in. were really necessary to determine the effect of mass on physical properties. Albert L. Colby's tests of 1902 were called to mind by Mr. Webster and the possible effect of the temperature of the quenching baths was dwelt upon by Mr. Devries.

The last paper of the evening was presented by John H. Hall on the "Heat Treatment of Hypo-Eutectoid Carbon Steel Castings." It was illustrated by numerous microstructures thrown on the screen. The object was to show the effect of various temperatures toward removing ingotism in cast steels under 0.90 per cent. carbon as well as to show the influence of micro-structures upon physical properties. The author stated that it was his experience that in cast steel heated above Ac_3 and cooled slowly, ferrite is re-precipitated more or less upon lines originally occupied by it in the raw steel; and that if the network arrangement is found in raw steel, traces of this will be seen in the refined product; also if the rarer "delta" arrangement of the primary ferrite is found in the raw steel few traces of ingotism will occur in the refined.

Laboratory and Service Tests of Steel

The paper of M. H. Wickhorst on "Rail Failures and Their Causes," as given in *The Iron Age* of June 26, came up first at the Wednesday evening session. In the discussion P. E. Carhart, Illinois Steel Company, said that geography and climatic conditions have much to do with rail failures. Results in warmer climates would constitute one group of facts, those in colder latitudes another, and the Rocky Mountain districts with their heavy grades and heavy braking, a third. The writer of the paper might have gone farther into the matter of increasing wheel loads and developed a very interesting branch of the subject.

Henry D. Hibbard, referring to the statement in the paper that "Hadfield recommends [to prevent piping] a sand top to the mold and a special arrangement to keep the top metal liquid until the bottom of the ingot has set," said that Mr. Hadfield's firm had made 25,000 tons of ingots by that method and with great success. Concerning the origin of seams he suggested that some of them came from skin blowholes which became filled with oxide of iron, and this becomes elongated in rolling.

N. G. Petinot, Titanium Alloy Mfg. Company, Niagara Falls, N. Y., called attention to the results from treating steel with ferro-titanium, presenting a table of analyses showing that the variations in carbon, manganese, phosphorus and sulphur content of different portions of a rail rolled from treated steel were much less than in the case of untreated steel, indicating that titanium diminishes segregation.

Robert Job in commenting on Mr. Wickhorst's statements concerning the formation of base seams in rails, suggested that it would be interesting to have the rail manufacturers' views on this point.

Oxygen in Steel

W. R. Fleming, chief chemist of the Andrews Steel Company, Newport, Ky., presented his paper on "Oxygen in Iron and Steel: Value of Ledebur Method for Its Determination," as published in the last issue of *The Iron Age*. In discussing the paper, A. S. Cushman, whose modification of the Ledebur method had been referred to in the paper, said he was free to confess that it is a difficult method when employed in the ordinary commercial laboratory, since it deals with extremely minute quantities of oxygen, as for example 0.04 per cent in open-hearth iron. A great deal depends on the way the sample is prepared and the way it is cared for after preparation to prevent the inclusion of any oxidized material. He would be sorry to see the Ledebur method become a specification matter and had discouraged this, yet he believed the manufacturer needs the Ledebur method in his laboratory. He agreed with the reader of the paper that much is yet to be found out about oxygen in ingots. The Ledebur method is an instrument of precision to men who are studying their product with a view to improving it. He agreed with the speaker that if one wants to find out the total of oxygen in his steel, the Ledebur method is not the one to use, but if he wants to know how much oxygen is combined with iron in contradistinction to oxygen combined with manganese or slag, then he should make use of the Ledebur method, as that does one thing and one thing only—shows the amount of iron combined in oxides reducible in hydrogen. It is a question how much any metallurgist knows about the state of deoxidization of metal in a furnace. The supposition is that at the end of the furnace process the bath of metal is thoroughly deoxidized. It would be a fine thing to be able to pour that metal in the absence of oxygen, for from the moment of pouring until it begins to set in the ingot mold the steel is greedily absorbing oxygen every moment. He questioned if all the oxidation does not take place subsequent to the pouring. His own opinion was that the little dots that are seen in specimens of magnified steel, which are called iron oxide, are slag points.

Cold Drawn Screw Stock

John A. Capp, General Electric Company, Schenectady, N. Y., presented the report of Committee A-8, on standard specifications for cold drawn steel. These are tentative as yet and the committee asks that they be used and the results under them be reported by members of the society. There are separate specifications for Bessemer automatic screw stock and for open-hearth automatic screw stock. In the former the range of analysis is as follows: Carbon, 0.08 to 0.16 per cent.; manganese, 0.60 to 0.80 per cent.; phosphorus, 0.09 to 0.13 per cent.; sulphur, 0.075 to 0.15 per cent. For open-hearth steel the limits for carbon are 0.15 to 0.25 per cent.; manganese, 0.60 to 0.90 per cent.; phosphorus, not over 0.05 per cent.; sulphur, 0.075 to 0.12 per cent. The permissible variations are 1 per cent. of diameter under size, on stock 0.03 in. diameter and under; 0.003 in. on stock over 0.3 in. to and including 1 in.; 0.004 in. on stock over 1 in. to and including 2½ in.; and 0.005 in. on stock over 2½ in.

The permissible eccentricities in the respective sizes as above are, in order: 0.5 per cent. of diameter, 0.0015 in., 0.0020 in., and 0.0025 in.

C. D. Young said that in the shops of the Pennsylvania Railroad they were using Bessemer stock on some of their automatic screw machines and the operators liked it, as it cut beautifully. It was found, however, that under shock the product cracked, due to high phosphorus content. Open hearth stock was then used and it was unpopular with the operators, as they found it almost impossible to keep dies and cutters sharp; but by insistence proper results were finally secured. As threaded parts are likely to be subjected to shock, the speaker suggested that Bessemer screw stock be avoided.

Replying to a question as to the reason for the high minimum percentages of phosphorus and sulphur provided in the specification, Mr. Capp said that material giving a brittle chip had freer working qualites, and that the committee purposely refrained from going into the question of physical properties.

Variations in Mechanical Properties of Heat-Treated Steel

A paper by R. P. Devries under the title "Mechanical Tests of Heat-Treated Spring Steels" gave some results of an investigation of the mechanical properties of certain steels which are seldom, if ever, used except in heat-treated condition. The part of the work dealing with a 1 per cent. carbon tool or spring steel was done by the Bureau of Standards in cooperation with the Pennsylvania Railroad. The mechanical tests included transverse, cold-bend, Brinell hardness and scleroscope tests. The steel was furnished by the Pennsylvania Railroad in specimen form, sending part of it in a heat-treated condition and part in an annealed condition to be heat-treated at the Bureau. It was found that steels which had nominally received the same heat treatment are widely different in their mechanical characteristics. In one case one end of a bar 10 inches long, exposed to the air a fraction of a second longer than the other end, dropped

below the critical temperature. It was suggested that possibly the difference in hardness of the two ends was due to the increase in temperature of the quenching medium causing the end entering last to receive a slower cooling through the critical temperature. It was found that steels quenched at the lower temperatures are hardest at the end entering the bath first. Specimens quenched at the lower temperatures were comparatively soft, inhomogeneous, and had a low proportional limit. The author also found that comparatively small changes in temperature of the quenching medium play an important part in the heat treatment of steel. In conclusion he says:

This paper has dealt in some detail with the inhomogeneity found in hardened steel, because the idea is more or less prevalent that the hardness test is useful only in a restricted sense. It has been said that it tests only a small portion of a given bar and therefore can not be representative even of a large test specimen. If several Brinell tests are made on inhomogeneous head-treated steel, an average quality factor can be obtained for the steel by this hardness test as well as by a tension or transverse test that can from its very nature yield nothing but an average value. If a bar of homogeneous heat-treated steel is to be tested, a few hardness tests can be made and the fact ascertained, whereas a whole specimen when tested in tension or transverse gives but small indication of homogeneity.

Some work has been done toward relating the results of hardness and transverse tests in the excellent report of the Spring Steel Committee of this society. [Proceedings, 1911.] In the present paper no attempt has been made to show a definite relation between the results of these tests because it soon became apparent that the same nominal heat treatments did not produce like results. Much of the work has been done to discover the reasons responsible for this failure; for it is evident that no test can identify a steel as having had a certain heat treatment unless a standard result for that particular heat treatment has been ascertained.

Another reason for not attempting to relate definitely the results of different tests is that the work is as yet incomplete, and was presented at this time in the hope that its further progress might be benefited through discussion and suggestions.

Relation of Wear to Hardness and Strength

The paper by George L. Norris on the "Resistance of Steels to Wear in Relation to Their Hardness and Tensile Properties" dealt chiefly with dry rolling friction, such as that of wheels and rails. The importance of this was emphasized by the vast tonnage of steel in service in the form of rails, wheels and tires. A machine for determining wear under dry rolling friction was described, the one originating with E. H. Saniter, of England, in 1908 being modified by the author. It was used in making a large number of tests on various grades of steel, comparing the results with hardness tests by the Brinell and scleroscope methods. Mr. Norris stated that the results he obtained confirm the conclusions of both F. Robin, (British) Iron and Steel Institute Proceedings, 1910, and E. Nusbaumer, engineer of the Derihon Steel Works, and those of actual service experience, that manganese, nickel, chromium and vanadium have a marked effect in increasing the wearing qualities of steels; also that the hardness test is not always a criterion, there being several instances where softer steels show less wear than the harder ones. The conclusion of the author, from the portion of the tests thus far made, is that manganese has a greater effect than either nickel or chromium, while vanadium evidently has a much greater effect than any one of the other elements. Tables showing the details of the tests were exhibited.

Committee Report on Wrought Iron

For Committee A-2, on standard specifications for wrought iron, S. V. Hunnings, chairman, presented specifications for wrought iron plates, which are printed elsewhere following this report. James P. Rae, Glasgow Iron Company, Pottstown, Pa., said that the requirements embodied in these specifications are somewhat beyond those in older specifications from which the committee had worked. It was voted that they be adopted and submitted for letter ballot.

In the past year the sub-committee dealing with specifications for staybolt iron has considered reinstating the vibratory test and modifying the requirement for tensile strength and elongation. It was decided to restore the vibratory test as soon as a series of tests on existing vibratory machines could be conducted, and the influence of the tensile strength and elongation on vibratory results determined. This will be done in the coming year.

Relation of Magnetic and Mechanical Properties

Charles W. Burrows presented a paper on "A Magnetic Criterion of the Mechanical Properties of a One Per Cent. Carbon Steel." Typical induction and hysteresis curves for annealed and hardened steels were shown, also other sets of curves embodying results of the author's investigations, as follows: Normal induction curves for a spring steel after various heat treatment; curves showing the relation between magnetic induction and fiber stress; the relation between Brinell hardness and magnetic induction; the effect of special heat treatment on the magnetic properties of a one per cent. carbon steel, etc. Definite deductions were not made, but the author suggested that as the magnetic properties of steel are very sensitive to changes in mechanical properties, it may in time be possible to get a complete story of a piece of steel from the former.

E. L. Lasier described a series of tests on welded boiler tubes made by the Bureau of Standards for the Division of Locomotive Boiler Inspection of the Interstate Commerce Commission. Most of the tubes tested were lap welded. The author did not give a summation of the results of the tests except to indicate the character of the failures. In 9 cases the tube failed outside of the weld; in 14 cases the failure was at the weld; in 11 cases the entire weld separated, and in 4 cases part of the weld failed and part of the metal failed at the weld.

Non-Ferrous Metals

The Friday afternoon session was devoted entirely to non-ferrous metals. J. A. Clapp, chairman, presented the report of Committee B-1 on standard specifications for copper wire. At some length the committee had discussed the matter of specifications for resistivity or conductivity of copper wire. It was again decided, as in 1909, that it is preferable to express the requirements in terms of directly measurable quantities, rather than by reference to some other quantity whose standard value is fixed only by agreement. The committee therefore unanimously voted that all reference to conductivity be removed from the specifications and that instead the requirements be stated solely as the maximum rejection limits to the resistivity. The committee had continued its joint work with the American Electric Railway Engineering Association Committee in the preparation of specifications for trolley wire. The committee of the above-named association had submitted a specification, but Committee B-1 was unable to agree to it and the matter will be considered further.

Specifications for Non-Ferrous Metals and Alloys

William Campbell, chairman, presented the report of Committee B-2 on non-ferrous metals and alloys, which included proposed specifications for Lake copper wire bars, cakes, slabs, billets, ingots and ingot bars; also a similar specification for these products in electrolytic copper. These two specifications take the place of the one now existing which has applied to what is virtually electrolytic copper. Both were referred to letter ballot.

The committee considers that it is impossible to draw up a specification for casting copper which would be acceptable to all even of the larger producers and consumers. The copper contents are quite variable, the better known brands containing over 99 per cent., while in some cases of virgin copper an assay of 99.9 per cent. is maintained regularly; and as long as the copper is clean, free from slag or dirt and shows good fluidity when melted, but little objection can be made to the particular impurities which may be present.

The sub-committee on white metals has investigated a series of five alloys, which represent the most widely used babbitt metals in service, as follows:

	Tin	Antimony	Copper	Lead
No. 1	89.00	7.00	4.00	....
No. 2	83.33	8.33	8.33	....
No. 3	50.00	12.00	1.00	37.00
No. 4	7.00	17.00	...	76.00
No. 5	....	10.00	...	90.00

The Brinell hardness tests and the compression tests which were made were unsatisfactory, as it was found that a standard method of making these tests would have to be formulated. The committee hopes that by next year the work will have gone far enough to make it possible to recommend satisfactory specifications covering babbitt metals. These will include five or perhaps six or seven

standard formulas with stipulation of maximum impurities standard methods of sampling and analysis, recommendation for proper heat treatment and method of manufacture, also physical tests showing whether the alloy was properly prepared and correctly heat treated.

William Campbell presented a metallographic study of lead-tin-antimony alloys, illustrated with lantern slides. G H. Clamer, commenting on one combination of the three metals which presented the phenomenon of surface crystals of tin and antimony, said that this explained the discrepancies which had frequently been noticed in the analyses of white metals.

Bearing Metals and Tests for Them

T. D. Lynch, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., in a valuable paper entitled "A Study of Bearing Metals and Methods of Testing," detailed the results of tests in the laboratories and works of his company. These were undertaken for the development of a reliable and practical test that would indicate the essential qualities of any babbitt metal and give a check on the materials and methods used in manufacture, so that it could be learned why a certain babbitt should be used, how it should be treated and what it would do in service. Motors operating under severe shop conditions were selected for the tests. Lead base linings were used, but troubles developed which led to a comparative study of tin-base and lead-base linings, a series of hammer tests being employed for this purpose. A variety of heat treatments and methods of handling the metal were adopted and these emphasized the favorable possibilities of the lead-base metal. Particular attention was given to the pouring temperature and heat treatment of the babbitts. The conclusions drawn as the result of the tests made and a large amount of service experience are thus stated by the author:

1. The number of compositions of babbitt metals should be as few as possible, preferably one of the tin-base and one of the lead-base, and each should be made the best of its class.

2. The constituent metals must be of superior grade, carefully tested and inspected, since the first requisite is a good raw material.

3. The alloying or smelting is of vital importance and must be so done that the high and low-melting-point metals may be properly alloyed far below the melting point of some of the component parts. A temperature of 500 deg. C. and less has been found to be sufficient to obtain satisfactory alloying of babbitt metal. The melted metal should at all times be kept covered with powdered charcoal or other protection from oxidation.

4. Pouring the babbitt too cold tends to produce a granular or coarse crystal formation and pouring it too hot tends to produce a softening effect. The lead-base babbitt is not nearly as fool-proof as the tin base, and therefore the range of pouring temperature is more limited. However, a pouring temperature of 460 deg. C. (450 deg. to 470 deg. C.) for both lead-base and tin-base babbitts has been found to give most excellent results.

5. Heating the shell to 100 deg. to 150 deg. C. before the babbitt is poured into it tends to prevent blowholes and similar defects and also prevents the lining from shrinking away from the shell.

6. Babbitted bearings must not be jarred while the metal is solidifying, since any disturbance at this temperature tends to enlargement of the crystals and corresponding brittleness.

7. The matrix of the lining metal should be just stiff enough to support the hard crystals. These hard crystals should be as numerous as possible and yet not lie on each other to cause brittleness.

8. A Brinell hardness of 23.5 for lead-base and 30 for tin-base babbitts has been found to give most excellent results.

These tests and suggestions are offered simply as a study to be furthered by those interested in applying babbitted bearings to their several service conditions; and while no final decision can be reached as the result of these tests, they certainly do emphasize the great importance of working closely to given compositions, and of following definite processes checked by chemical tests, Brinell tests, hammer tests, careful supervision, and finally by the court of last resort, service.

A paper of considerable length prepared by Gilbert Rigg and G. M. Williams gave the results of tests designed to show the relative strength of various brands of spelter or cast zinc. One point brought out in connection with the western spelters was that their increased resistance in compression is for the most part due to their cadmium content.

Testing and Miscellaneous Subjects

The session of Saturday morning, June 28, was given up to papers on a variety of subjects, including testing. A report was presented from Committee A-10 on hardness tests, D. E. Douty, chairman. E. L. Lasier briefly described a number of large capacity testing machines in the United States and England. He gave a list of machines of 600,000 lb. capacity or greater, of which 20 are in the United States and three in England. Ten of the machines are of 1,000,000 lb. capacity or more, all in the United States. Views were given of several notable machines, including the 10,000,000-lb. machine of the Bureau of Standards at its laboratories in Pittsburgh, this being the largest testing machine in the world. Other papers presented in synopsis or by title at the concluding session were the following: "Spherical Bearings," by Mont Schuyler; "Use of the Strain Gauge in the Testing of Materials," by Willis A. Slater and Herbert F. Moore; "Conservation and Shipping Containers," by B. W. Dunn; "Suggestions as to Standard Specifications to Promote Efficiency and Safety in Explosives Used in Blasting," by C. P. Beistle.

An interesting series of papers on cement, concrete and waterproofing came up for consideration at the two sessions of Thursday, a rather sharp discussion enlivened by pointed criticism being developed by the paper on "Autoclave Tests for Cement," by H. J. Force.

Action on Committee Chairmanships

A matter which has been the subject of considerable comment was taken up at the Wednesday evening session. Secretary Marburg presented for submission to letter ballot a resolution passed by the executive committee at a meeting held the same day. This was to the effect that the regulation of the society requiring that chairmen of committees be selected from representatives of consuming interests or unattached experts be made to apply to committees constituted before this regulation was adopted, as well as to those organized afterward. A member asked as to the meaning of the resolution and Secretary Marburg replied that the chairmanship of one committee of the society was held by a manufacturer and that the executive committee was of the opinion that this anomaly should not longer exist. The resolution was adopted unanimously.

Three New Specifications for Iron and Steel

Those Proposed for Rail-Steel Concrete Reinforcement Bars, for Wrought Iron Plates and for Blooms, Billets and Slabs for Carbon-Steel Forgings

Below are given three of the new specifications covering iron and steel products which were presented at the Atlantic City meeting of the American Society for Testing Materials at Atlantic City last week. Those for rail-steel concrete reinforcement bars differ but little from the specifications for concrete reinforcement bars rolled from tee rails, which were adopted in 1912 by the Association of American Steel Manufacturers and published in *The Iron Age* of August 29, 1912, page 464. One difference is the omission in the specifications below of the provision in the manufacturers' specifications that "in case a tensile specimen does not meet the specifications, an additional test may be made." Further, there is nothing in the manufacturers' specifications corresponding to Section V in the specifications herewith, headed "Inspection and Rejection." All three of the specifications below were approved by the meeting and referred to the membership on letter ballot:

Proposed New Standard Specifications for Rail-Steel Concrete Reinforcement Bars

1. These specifications cover three classes of rail-steel concrete reinforcement bars, namely: plain, deformed and hot-twisted.

I. MANUFACTURE

2. The bars shall be rolled from standard section tee rails.

3. Hot-twisted bars shall have one complete twist in a length not over 12 times the thickness of the bar.

II. PHYSICAL PROPERTIES AND TESTS

4. (*a*) The bars shall conform to the following minimum requirements as to tensile properties:

Properties considered	Plain bars	Deformed and hot-twisted bars
Tensile strength, lb., per sq. in.	80,000	80,000
Yield point, lb., per sq. in.	50,000	50,000
	1,200,000	1,000,000
Elongation in 8 in., per cent.*	———	———
	Tens. str.	Tens. str.

*See Section 5.

(*b*) The yield point shall be determined by the drop of the beam of the testing machine.

5. (*a*) For bars over ¾ in. in thickness or diameter, a deduction of 1 from the percentage of elongation specified in Section 4 (*a*) shall be made for each increase of ⅛ in. in. thickness or diameter above ¾ in.

(*b*) For bars under 7/16 in. in thickness or diameter, a deduction of 1 from the percentages of elongation specified in Section 4 (*a*) shall be made for each decrease of 1/16 in. in thickness or diameter below 7/16 in.

6. The test specimen shall bend cold around a pin without cracking on the outside of the bent portion, as follows:

Thickness or diameter of bar	Plain bars	Deformed and hot-twisted bars
Under ¾ in.	{ 180 deg.	180 deg.
	{ d = 3 t	d = 4 t
¾ in. or over	{ 90 deg.	90 deg.
	{ d = 3 t	d = 4 t

Explanatory Note—

d = the diameter of pin about which the specimen is bent;
t = the thickness or diameter of the specimen.

7. (*a*) Tension and bend test specimens for plain and deformed bars shall be taken from the finished bars, and shall be of the full thickness or diameter of bars as rolled; except that the specimens for deformed bars may be machined for a length of at least 9 in., if deemed necessary by the manufacturer to obtain uniform cross-section.

(*b*) Tension and bend test specimens for hot-twisted bars shall be taken from the finished bars, without further treatment.

8. (*a*) One tension and one bend test shall be made from each lot of ten tons or less of each size of bar rolled from rails varying not more than 10 lb. per yd. in nominal weight.

(*b*) If any test specimen shows defective machining or develops flaws, or if a tension test specimen breaks outside the middle third of the gage length, it may be discarded and another specimen substituted.

III. PERMISSIBLE VARIATIONS IN WEIGHT

9. The weight of any lot of bars shall not vary more than 5 per cent. from the theoretical weight of that lot.

IV. FINISH

10. The finished bars shall be free from injurious defects and shall have a workmanlike finish.

V. INSPECTION AND REJECTION

11. The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the bars ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the bars are being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

12. Bars which show injurious defects subsequent to their acceptance at the manufacturer's works will be rejected, and the manufacturer shall be notified.

Proposed New Standard Specifications for Blooms, Billets and Slabs for Carbon-Steel Forgings

1. (*a*) These specifications cover five classes of billets, determined by their carbon ranges as specified in Section 6.

(*b*) The purposes for which these classes are frequently used are as follows:

Class A, for welding and case hardening;
Class B, for case hardening when subsequently heat-treated;
Class C, for special purposes;
Class D, for axles, shafts, connecting rods and similar forgings;
Class E, for Class D forgings when they are to be heat-treated.

2. The term "billets" will be used in these specifications to designate blooms, billets and slabs.

3. (*a*) Billets shall be purchased as semi-finished rolled or forged material. In ordering, all dimensions shall be expressed in feet and inches.

(*b*) Unless otherwise specified, the billets shall be made from ingots of at least four times the sectional area of the billet.

I. MANUFACTURE

4. The steel shall be made by the open-hearth process.

5. A sufficient discard shall be made from each ingot to secure freedom from injurious piping and undue segregation.

II. CHEMICAL PROPERTIES AND TESTS

6. The steel shall conform to the following requirements as to chemical composition:*

Elements considered	Class A	B	C	D	E
Carbon, per cent.†	0.08-0.18	0.15-0.25	0.25-0.38	0.38-0.52	0.45-0.60
Manganese, per cent.	0.30-0.50	0.30-0.50	0.40-0.60	0.40-0.60	0.45-0.70
Phos., max., per cent.	0.045	0.045	0.045	0.045	0.045
Sul., max., per cent.	0.05	0.05	0.05	0.05	0.05

*The chemical requirements as to manganese and phosphorus have purposely been made somewhat lower than those in the standard specifications for finished products for the protection of the purchaser of billets, so that with reasonable variations from segregation in the billets the finished product will meet the specified chemical requirements.

†See Section 8 (*b*).

7. An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, a copy of which shall be given to the purchaser or his representative. This analysis shall conform to the requirements specified in Section 6.

8. (*a*) Analysis may be made by the purchaser from at least one billet representing each melt, which shall conform to the requirements specified in Section 6. Drillings for analysis shall be taken from the billet with a ½-in. drill, parallel to the axis of the ingot as cast, at any point midway between the center and surface.

(*b*) In addition to the complete analysis specified in paragraph (*a*), a carbon determination may be made by the purchaser of drillings taken from the center of the billet with a ½-in. drill, parallel to the axis of the ingot as cast, to determine by the variation in carbon the amount of segregation.

III. WORKMANSHIP AND FINISH

9. The billets may be chipped to a depth not over ½ in., unless otherwise specified. Chipping shall be done in such a manner as not to cause laps when the billets are properly forged.

10. The billets shall be free from injurious defects and shall have a workmanlike finish.

IV. MARKING

11. The melt number shall be legibly stamped on each billet 6 in. in thickness or over; and the top end of all "top cut" billets of such sizes shall be hot-stamped with the letter "T" and such ends crisscrossed with green paint. The melt number shall be legibly stamped on billets of smaller section when specified.

V. INSPECTION AND REJECTION

12. (*a*) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the billets ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the billets are being furnished in accordance with these specifications. Tests and inspection at the place of manufacture shall be made prior to shipment.

(*b*) The purchaser may make the tests to govern the acceptance or rejection of billets in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(*c*) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

13. (*a*) Unless otherwise specified, any rejections based on tests made in accordance with Section 12 (*b*) shall be reported within five working days from the receipt of samples.

(*b*) Billets which show injurious defects while being finished by the purchaser will be rejected, and the manufacturer shall be notified.

14. Samples tested in accordance with Section 12 (*b*), which represent rejected billets, shall be preserved for two weeks from the date of the test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

Proposed Standard Specifications for Wrought-Iron Plates

1. These specifications cover two classes of wrought-iron plates, namely:

Class A, as defined in Section 2 (*b*);
Class B, as defined in Section 2 (*c*).

I. MANUFACTURE

2. (*a*) All plates shall be rolled from piles entirely free from any admixture of steel.

(*b*) Piles for Class A plates shall be made from puddle bars made wholly from pig iron and such scrap as emanates from rolling the plates.

(*c*) Piles for Class B plates shally be made from puddle bars made wholly from pig iron or from a mixture of pig iron and cast-iron scrap, together with wrought-iron scrap.

II. PHYSICAL PROPERTIES AND TESTS

3. The plates shall conform to the following minimum requirements as to tensile properties:

Properties considered	Class A — 6 in. to 24 in., inclusive, in width	Class A — Over 24 in. to 90 in., inclusive, in width	Class B — 6 in. to 24 in., inclusive, in width	Class B — Over 24 in. to 90 in., inclusive, in width
Tensile strength, lb., per sq. in....	49,000	48,000	48,000	47,000
Elastic limit, lb., per sq. in.....	26,000	26,000	26,000	26,000
Elongation in 8 in., per cent.....	16	12	14	10

4. For plates under 7/16 in. in thickness, a deduction of 1 from the percentages of elongation specified in Section 3 shall be made for each decrease of 1/16 in. in thickness below 7/16 in.

5. (*a*) *Cold-bend Tests.*—The test specimen shall bend cold through 90 deg. without fracture on the outside of the bent portion, as follows: For Class A plates, around a pin the diameter of which is equal to 1½ times the thickness of the specimen; and for Class B plates, around a pin the diameter of which is equal to 3 times the thickness of the specimen.

(*b*) *Nick-bend Tests.*—The test specimen, when nicked on one side and broken, shall show for Class A plates a wholly fibrous fracture, and for Class B plates, not more than 10 per cent. of the fractured surface to be crystalline.

6. Tension and bend test specimens shall be taken from the finished plates and sha'l be of the full thickness of plates as rolled. The longitudinal axis of the specimen shall be parallel to the direction in which the plates are rolled.

7. (*a*) One tension, one cold-bend and one nick-bend test shall be made for each variation in thickness of ⅛ in. and not less than one test for every ten plates as rolled.

(*b*) If any test specimen fails to conform to the requirements specified through an apparent local defect, a retest shall be taken; and should the retest fail, the plates represented by such test shall be rejected.

III. FINISH

8. The plates shall be straight, smooth and free from cinder spots and holes, and free from injurious flaws, buckles, blisters, seams and laminations.

IV. INSPECTION AND REJECTION

9. (*a*) The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the plates ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the p'ates are being furnished in accordance with these specifications. Tests and inspection at the place of manufacture shall be made prior to shipment.

(*b*) The purchaser may make the tests to govern the acceptance or rejection of plates at his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

Book Reviews

Safety. Methods for Preventing Occupational and Other Accidents and Disease. By William H. Tolman, Ph.D., director of the American Museum of Safety, and Leonard B. Kendall. Pages 422, 6 x 8¼ in. Cloth. Published by Harper & Brothers, 325 Pearl street, New York City. Price, $3.

That the movement for the prevention of accidents and disease among workers has attained an important footing in this country is shown by the appearance of this impressive book under the auspices of the great publishing house of Harper & Brothers. It is not only the largest work issued on the subject, but it is stated to be the only comprehensive one on safety that has appeared in the English language. Dr. Tolman has for years devoted his attention to the promotion of educational work for the prevention of accidents and is the founder of the American Museum of Safety, in whose activities many of the leading manufacturers of this country have become interested. He has been enabled through the collections of the museum to gather the enormous array of protective devices which are illustrated and described in this book. It is thus a handbook of practical information for industrialists.

Dr. Tolman contends that 50 per cent. of industrial accidents are preventable and proves his contention by examples taken from many sources. It is shown, for instance, by actual statistics from shops and plants of the Pennsylvania Railroad, Midvale Steel Company and United States Steel Corporation that the reduction of serious shop accidents last year was 63, 61 and 45 per cent. respectively. The study of this book and the careful application of the safety methods and devices shown cannot fail to secure equally excellent results in other industrial operations in which sufficient attention has hitherto not been given to this important matter.

The contents of the book are arranged in four parts, each of which is divided into chapters covering special subjects. Part I relates to general conditions, under which are considered the philosophy of safety, neglected factors and the working place. Part II covers danger zones. Important among these are the yards, walks, railings and hoists at factories and other places where workmen are employed. Illustrations are given of devices for the greater safety of men whose occupations require them to traverse or be employed in such places of danger. Numerous illustrated descriptions are given of devices used in operating cutting and grinding tools. The question of illumination of dangerous machinery is thoroughly treated. Fire protection comes in for careful consideration. The organization of safety committees is the subject of an entire chapter showing how effectively the protection of men in a factory can be secured by the observations of some of their force charged with the duty of recommending safety regulations. A chapter on methods adopted at iron and steel plants gives a multitude of suggestions, largely taken from the practice of subsidiaries of the United States Steel Corporatioan. The safeguarding of workmen in mines is not overlooked. A chapter is given to methods necessary for the safeguarding of workmen in electric power houses and elsewhere at which electric power is used. A chapter presents a bright page in American altruistic endeavor by the enumeration of practical work done in the direction of safety through organized effort by employers.

Part III treats of industrial hygiene, discussing problems of sanitation and methods by which epidemics of communicable diseases can be avoided. Part IV relates to social welfare, giving statements of work that has been accomplished in the direction of industrial education and the promotion of comfort among employees in their afterhours. The work of the American Museum of Safety is described and the necessity for its enlargement is convincingly presented. The book concludes with this forcible statement: "Safety is so vital a phase of industrial, economic and social welfare that the full presentation of its consequence should be sufficient for its general recognition and for larger action than Americans have taken heretofore."

Resuscitation. By Charles A. Lauffer, M. D. Pages iv. + 47, 4¼ x 6⅝ in. Cloth. Published by John Wiley & Sons, New York.

The constantly increasing interest in safety and accident prevention lends added value to this little book by Dr. C. A. Lauffeur, medical director of the Westinghouse Electric & Mfg. Company. It includes a reprint of a paper delivered by the author before the Philadelphia section of the National Electric Light Association. He gives a clear description of the mechanism of respiration and of the prone pressure or Schafer method of resuscitation, which latter he describes in detail. The book also emphasizes the necessity of people in general being versed in the principles of resuscitation and demonstrates clearly how these principles can be learned so as to prove of valuable assistance to persons in the ordinary walks of life.

Machinery is being placed in position at the plant of the Wheeling Sheet & Tin Plate Company, at Yorkville, Ohio, which, it is expected, will be ready for operation the middle of August. A number of former employees of works at Steubenville, Ohio, have already accepted positions and will move to Yorkville, where many workmen's houses are being erected.

At a meeting of the stockholders of the Ohio Valley and Novelty Stamping companies at Bellaire, Ohio, it was decided to enter the merger with the Enterprise Enamel Company, of the same city, which is being financed by the Geiger-Jones Company, Canton, Ohio. Of the merger's $2,000,000 stock, $750,000 will be preferred and $1,250,000 common.

Customs Decisions

Cast Machinery Parts

The United States Court of Customs Appeals has handed down a decision in the case of Leigh & Butler and several other Boston importers involving refunds aggregating approximately $2,000,000. The merchandise consisted of various cast-iron repair or replacement parts for textile machinery. The importations considered by the court consisted of grooved rim pulleys, flats for carding engines, doffer gears, lattice shaft brackets, levers for combing machines, etc. These parts were first cast in molds and subsequently were chiseled, drilled and machined; they thereby were made ready for immediate attachment to the machines for which severally they were designed. The pieces, as imported, were separate, without attachments, and did not together constitute entire machines in a knocked-down condition.

The appraiser at Boston returned the importations as "manufactures of metal" at 45 per cent. under paragraph 199 of the tariff act, as not specially provided for. The importers protested, claiming the merchandise to be dutiable properly as iron castings advanced in condition within paragraph 147, and therefore dutiable at 8/10 of 1c., per lb., and an additional duty of 2/10 of 1c. per lb. The attorneys of the Department of Justice contended that the description "made up into articles" includes individual castings like those in the present case, which have been finished into completed usable units. On the other hand, the importers claimed before the board of general appraisers and the customs court that the description referred to does not apply to detached parts, but only to entireties which are usable within themselves, either as completed entireties or as assembled articles. Judge Martin, in his opinion for the court, affirmed the general board in sustaining the importers' claims. He says in part:

> The claim of the Government is that a casting may be advanced in condition up to the point of becoming a completed usable unit and nevertheless remain dutiable as an advanced casting, but that as soon as that point is reached the casting immediately loses its identity as an advanced casting, and is excluded from classification as such. In answer to this claim, it may be said that such a rule would tend to confusion in administration, and would not accomplish any reasonable result, since under it such parts as these could be almost entirely completed abroad and thereupon imported as advanced castings. The only result would be that such parts would be imported not quite entirely completed in condition, and nevertheless be dutiable under paragraph 147. It does not seem probable that this construction was intended by Congress in the use of the disputed term.

The decision goes on to answer in detail all of the Government's other objections against the claims of the importers. As the court construes the tariff act of 1909, the importers' contention for the lower rates of duty is sustained.

Meat-Slicing Machines

The same court denied a contention by Gallagher & Ascher, Chicago, relating to the classification of meat-slicing machines. Duty was taken on the machines at 45 per cent. under paragraph 199, as "manufactures of metal not specially provided for." They were claimed dutiable at 30 per cent. under paragraph 197, as machine tools. The board of general appraisers overruled the protest. A rehearing was asked by the importers on the ground of new evidence, but was denied by the board. The importers thereupon appealed to the court claiming error in the board's refusal to re-try the issue. The court finds there was no error, and affirmed the board's decision.

Pencil Sharpeners Not Machine Tools

The same court has overruled a protest filed by the Favor-Ruhl Company, dealing with portable machines for sharpening lead pencils. The machines consist of a sliding socket which holds the pencil while it is pressed against a wheel with cutting edges. The wheel is revolved by cogs connected with a hand crank. The collector at New York assessed the machines at 45 per cent. under paragraph 199, as "manufactures wholly or in part of metal." The importer claimed the articles to be machine tools, dutiable under paragraph 197, at 30 per cent. The board of general appraisers overruled the protest. In affirming the board, the court held that the importer failed to show that the goods were known in trade as machine tools.

Pocket Knives

The Board of United States General Appraisers has laid down the principle that merchants are at liberty so to import goods as to subject them to the lowest possible duties under the tariff law. The doctrine is also enunciated that it is not for customs officers, in imposing duties, to speculate upon contingencies. They must take articles as they find them to be upon examination. The case before the board stood in the name of A. Kastor & Bros., and other importers, who objected to the classification made on pocket knives from Germany.

The collector classified the knives as "unfinished," requiring the payment of duty at 10c. each and 40 per cent. ad valorem, instead of at the rate of 5c. each and 40 per cent., the rate prescribed by paragraph 152 of the tariff act for finished pocket knives. Each knife was made up of the necessary parts, fully finished and assembled, together with a scale or handle covering the article. The customs authorities justified their assessment on the ground that the handles were made of cheap material in order to obtain admittance as finished knives for the articles themselves. The customs officers contended further that, after importation, jewelry manufacturing concerns remove the handles and substitute handles of gold or silver. This practice was claimed by the Government to be a mere subterfuge to obtain a lower duty than would be applicable if they were made otherwise. In sustaining the importers' protests, Judge Fischer, in his decision for the board, holds that it is the business of the customs officials to take duty on imported goods as they are found upon examination.

Engraved Plates and Dies

The board took favorable action on a protest by A. D. Maclachlan, Boston, regarding the proper rate of duty to accrue on engraved plates and dies. They were assessed at 45 per cent. under paragraph 199 as "manufactures of steel." Duty was claimed under paragraph 185 at 20 per cent. as plates engraved for use in printing.

Barking Machines Not Machine Tools

It was decided by the board that barking machines used in stripping the bark from logs are not machine tools within the meaning of the act of 1909. William A. Bird, Buffalo, the importer, claimed a rate of 30 per cent. under paragraph 197. The collector's assessment at 45 per cent. under paragraph 199, as "manufactures of metal," was affirmed.

Betterment of Miners' Welfare

The United States Bureau of Mines is about to investigate the conditions under which a miner works, believing that the unsanitary conditions which exist in some of the mines as well as in some of the mining towns are a factor in the death rate among the men. It is intimated that these conditions not only unnecessarily cause the death of miners through disease, but they are often responsible for accidents which might not have happened if the miners were in perfect health. The bureau has organized what is known as the Mine Sanitation Section, in charge of J. H. White, engineer.

The bureau hopes to bring about progress by appealing to the miner, the manager, and the owner, showing that all three can assist, and how all three can be benefited by good sanitary conditions. It will reach the miner by means of illustrated lectures, moving picture exhibits and pictorial circulars. These will show how sickness and suffering are spread by careless habits, and will drive home the importance of personal and household cleanliness. The bureau will assist the managers by pointing out glaring sanitary menaces, and showing methods and costs of abatement. It will describe in bulletins common unsanitary practices and show the evils which follow in their wake. It will submit sanitary rules and regulations and show the best methods for their enforcement.

Sheet metal window manufacturers are figuring on one of the largest inquiries that has ever come out for metal windows. The windows are to be used in the Bible Institute Building, Los Angeles, Cal. The order will amount to about $45,000. Another large inquiry that is pending is for about $18,000 worth of windows for various buildings to be erected by the New England Telephone Company.

The Machinery Markets

In most machinery selling centers there prevails the slower trading which comes with summer weather and conditions are made more quiet than usual by uncertainty as to pending currency and tariff legislation. The largest business before the trade anywhere is from the Government for navy yard equipment for Pearl Harbor, Hawaii. The New York market had a quiet week and inquiries are appearing more slowly. In Philadelphia also, inquiries are light and transactions generally are of small proportions. In New England nearly all staple metal products are in good demand, though in many lines, including the machine tool industry, there is a little less activity and in some cases shop extensions are being postponed until money is easier. Cleveland has felt an improvement both in buying and new inquiry. In Cincinnati business, both domestic and export, has been slower and some talk is heard of shut-downs in July to permit of plant overhauling. June business does not sum up well in Detroit, although there is a fair demand for special equipment and the foundry business is better; at present small transactions are the rule and there is little feature to the market. Chicago has had a steady inflow of small orders, and otherwise the conditions are those characteristic of the summer season. The Milwaukee market has a quiet tone. While some large houses in the Central South, especially those dealing in electrical equipment, are busy, the trade generally is quiet. In the Birmingham district foundry operations have slowed down, but there appears to be no let-up in the demand for machinery and machine tools. Good crop prospects are holding up confidence in all lines in St. Louis, where there is a fair amount of trade considering the summer dullness. Dealers on the Pacific coast are figuring on a fair number of tentative inquiries which are promising for the future, but not expected to result in sales until the present tendency to hesitate disappears.

New York

NEW YORK, July 2, 1913.

Government purchases for various navy yards, including the large amount of equipment for Pearl Harbor, Hawaii, supplied the feature of most interest and importance to the trade in the last week. Generally the trade has been quiet with fewer inquiries coming to notice. At the same time the market is by no means devoid of sales and two or three managers for machine tool manufacturers say that June transactions will total a fair figure. Most of the sales resulted from inquiries made weeks ago. The Delaware, Lackawanna & Western Railroad has not bought against its recent list. The matter is in the hands of shop officials at Scranton, but is expected to reach the purchasing agent soon. Proposed additional purchases by the Government include 10 items classed as machine tools by the Navy Department, all for Mare Island, Cal., as follows:

Two pneumatic motor chain hoists.
Two motor-driven abrasive grinding machines.
One motor-driven nipple cutting machine.
One motor-driven improved pipe threading and cutting-off machine.
One hydraulic pipe bending machine.
One pipe expanding machine.
One pipe threading and cutting-off machine.
One motor-driven cold metal saw.
All are included in schedule 5597, and bids will be opened July 22.

The machinery and mechanical equipment of the Noye Mfg. Company, Buffalo, N. Y., consisting of separate departments for the manufacture of Wilson automatic steering gears (patented); Noye automobile radiators, machine pulleys and floor pulleys, including that for sweep molding, and 1400 lots of machine shop, woodworking and foundry equipment, are to be sold at auction July 10. The sale will be conducted by J. E. Conant & Co., Lowell, Mass., on the premises of the Noye Mfg. Company, 50 Lake View avenue, at the corner of Jersey street, and will begin at 10 a. m. Each of the four separate departments will be sold as a unit and in its entirety. Of the 1400 lots of miscellaneous equipments 30 per cent. is declared to be practically new. Included in the miscellaneous property are several automobiles, machine tools, machinery, etc., belonging to the E. R. Thomas Motor Car Company, in legal escrow at the time of the sale of that company and since released.

Local machinery dealers are interested in the sale at auction July 8 of the business and plant of H. G. Barr, Worcester, Mass., manufacturer of sensitive drilling and tapping machines, staybolt drilling machines and special devices and attachments for such machines. J. E. Conant & Co., Lowell, Mass., will conduct the sale in lots to suit purchasers at the Barr plant, 21 Hermon street, Worcester. Mr. Barr is retiring from business. Three lots will include patents and patents applied for and pending, and in some cases the special equipment, drawings, finished and unfinished parts required for making the machines in which Mr. Barr has specialized. In all 316 lots will be disposed of, including a large number of machine tools and miscellaneous shop equipment. The property may be inspected daily from July 3 until the sale.

The iron foundry of Louis Sacks, in Hamburg place, west of the Central Railroad of New Jersey, Newark, N. J., is to be enlarged by an addition 70 x 100 ft., to cost $15,000. The addition will be of brick and 39 ft. in hight.

The Newburgh Tool & Machine Works, Inc., Newburgh, N. Y., recently incorporated, is making arrangements for a manufacturing plant. R. G. Stewart, 166 Montgomery street; H. R. Lozier and C. W. U. Sneed are the incorporators. The authorized capital stock of the company is $50,000.

The Unique Brass Foundry Company, 25 Illinois street, Buffalo, has purchased a site for a foundry plant at Grant street and the New York Central Railroad and will erect and equip a building this summer.

The Larkin Company, soap manufacturer, Buffalo, is building an addition to its plant at 235-237 Van Rensselaer street.

The Kern Mfg. Company, Buffalo, recently incorporated with a capital stock of $25,000, will establish a plant for the manufacture of patented window cleaning devices. W. G. Grove, 87 West Genesee street; W. T. Stewart and H. Bissell are the incorporators.

The E. R. Caldwell & Son Brass Company, Inc., Syracuse, N. Y., has been incorporated by E. R., R. L. and F. L. Caldwell, 210 Onondaga avenue, and will operate a general foundry for the manufacture of brass castings. The capitalization of the company is $50,000.

The plant of the Batavia Preserving Company, Batavia, N. Y., was burned to the ground June 27, involving a loss of $125,000 on plant and machinery. It is stated the plant will be rebuilt at once. A large equipment of canning machinery will have to be replaced.

Additions and improvements to cost approximately $100,000 are to be made to the plant of the Syracuse Lighting Company, Syracuse, N. Y. J. C. DeLong is general manager.

The board of contract and supply of Schenectady, N. Y., is receiving bids for heating and ventilating apparatus and electrical equipment for three new schools to be erected this summer in the second, ninth and tenth wards. Address Frederick E. Johnson, secretary.

Bids are being received this week by the board of contract and supply, Binghamton, N. Y., for the construction of a municipal electric lighting plant on Noyes Island from plans of Douglas Sprague, consulting engineer, 39 Cortlandt street, New York City.

The Sheehan Felt Press Roll Company, Inc., Green Island, N. Y., has filed articles of incorporation with a capital stock of $100,000 to manufacture felt press rolls and paper-making machinery. W. E. Sheehan, Albany; A. H. Bogan, Jersey City, N. J., and E. C. Doyle, Cohoes, N. Y., are the incorporators.

The Smith-Angevine Company, Port Chester, N. Y., has had plans prepared for a factory building for the manufacture of soap and other products from hides, which it will erect on Purdy avenue. The cost with equipment will be about $30,000.

The W. A. Lawrence Company, Inc., Poughkeepsie, N. Y., has recently been incorporated with a capitalization of $20,000 and will equip a plant for the manufacture of knitted and woven fabrics.

The United States Hame Company, 135 Tonawanda street, Buffalo, N. Y., is enlarging its plant by the addition of a blacksmith shop, the estimated cost of which is $15,000.

Plans have been completed for an extension to the plant of the E. J. Wilkins Company, Gloversville, N. Y., manufacturer of pocketbooks and leather novelties. The addition will be 24 x 26 ft., four stories, of wood, mill construction, and will add about 2500 sq. ft. to the present plant. Part of the new building will be used for office purposes and the remainder for manufacturing.

Drill Attachment for Planer

An inquiry has been received for the address of manufacturers who can supply a radial drill attachment for a metal planing machine. The inquirer has only occasional use for the planer and desires an attachment which will adapt it to radial drill work. Any information sent to this office will be forwarded to the company making the inquiry.

New England

BOSTON, MASS., July 1, 1913.

The money market is the prevailing influence in industry and the principal topic of discussion. Proposed extensions of manufacturing properties have been held up for this reason, the banks declining to make loans for such purposes until money is easier. Significance as to actual operations may be placed upon the experience of certain industries the products of which enter into widely varied lines of manufacture. Machine screws, brass and its staples, wire and its products, pressed metal goods, are all in active demand. The foundries are less active, and so are the drop forge shops, the latter because of slackening automobile trade. Some question exists as to whether the present let-up is more than a seasonable condition. It may be that it is, but the fact should be taken into account that the dulness occasioned by the vacation period is generally preceded by the somewhat depressing influence of the mid-year inventory season. The machine tool builders are somewhat less active. The dealers report an average trade.

The strike at the works of the B. F. Sturtevant Company and the Becker Milling Machine Company, Hyde Park, Mass., is still in progress, but the men are returning to their work a few at a time, and this movement is growing. The strike has not been a success in any way. It was begot largely in politics; Governor Eugene N. Foss of Massachusetts is the controlling owner of both companies. The demand of the unions for a 5½-day week, 20 per cent. increase in wages and recognition of the unions, was flatly refused by the Governor, nor have any concessions been made, nor will be. Another demand was for time and a half pay for overtime work, but this rule already prevailed. The foundries were not affected. Probably the next 10 days will see the plants much nearer to a normal basis of production. Both have been operating with reduced forces, which have been increasing with accelerating rapidity.

Elsewhere in New England labor troubles are scattered and not of great importance. At Springfield, Mass., the Hendee Mfg. Company is having trouble with its machinists. Boiler makers employed at Boston are on strike, with the owners gradually gaining ground. A few foundries are affected. On the whole labor conditions are excellent, the percentage of employees affected being exceedingly small.

The Hendee Mfg. Company, Springfield, Mass., has taken out a factory building permit for the new factory at its State street works, which will cost $100,000. The structure will be 50 x 250 ft., with two wings, each 44 x 70 ft., and the whole five stories. This is in addition to the large buildings in process of construction on a new site in the suburbs, which will include a complete drop forging plant. The company manufactures motor cycles on a very large scale.

The business of the C. A. C. Axe Company, manufacturer of hand forged axes and hunting hatchets, has been reorganized, and will establish works at Holbrook, Mass. The office was formerly at 12 Pearl street, Boston. John Underhay is president, W. Clifton Packard treasurer, and J. W. Collins general manager, the three comprising the board of directors. No new equipment will be required at present, the company states.

The drop forging shop of the newly organized Hartford Drop Forge Company, Hartford, Conn., will be of steel frame construction with corrugated metal covering, and will be 26 x 40 ft., one story.

The Metz Company, Waltham, Mass., manufacturer of automobiles, is erecting an addition to its shops.

The city of Springfield, Mass., will build a school workshop, 73 x 75 ft., two stories and basement.

The Berbecker & Rowland Mfg. Company, Waterville, Conn., will erect a casting shop 43 x 122 ft., with ell 16 x 23 ft., and an addition to the dip room building, 43 x 152 ft., both of brick, steel and concrete construction.

A New England Industrial Exposition will be held in Boston from October 4 to November 1.

Additions to general manufacturing plants of New England include the following: Renfrew Mfg. Company, Adams, Mass., large addition to a weave shed; A. D. Carter Mill, Tilton, N. H., three-story addition, 30 ft. long; Stillwater Worsted Company, Harrisville, R. I., addition for dyeing and finishing departments; Royal Typewriter Company, Hartford, Conn., addition 50 x 83 ft., one story.

Philadelphia

PHILADELPHIA, PA., June 30, 1913.

June business will from present indications fall below that of May. There has been a gradual decline in the demand, hesitancy on the part of buyers increasing as the month has advanced. Current inquiry is light and confined almost entirely to single tool propositions. Railroad buying continues unsatisfactory; occasional small orders are placed, but large orders against recent heavy inquiries are generally held up. It is stated that the Lehigh Valley has postponed action indefinitely in connection with its recent inquiry for equipment. Builders of some classes of machinery and equipment note a slight decrease in activity, largely attributed to uncertainties in connection with proposed tariff changes, which are expected to be more drastic than was proposed in the original Underwood bill. A moderate movement in second-hand machinery and power equipment is reported. Boilers and engines continue in fair demand.

The Harlan & Hollingsworth Corporation, Wilmington, Delaware, is planning extensive reorganization in view of increasing facilities both for ship and car building. The present capacity as to length of vessels the company can build is 350 ft., but present plans involve alterations and additions that will enable it to construct vessels ranging up to 520 ft. This will involve the entire remodeling of its launching slips and the installation of modern electric traveling crane systems. A large list of general machinery will be required in different departments, but the list of requirements has not yet been completed. Improvements to the company's car building facilities have been extensively made during the past two years.

The Kieth-Stewart Company has been incorporated with a capital stock of $10,000. This concern represents the selling branch of the Kieth-Stewart Company, Brooklyn, N. Y., manufacturer of cups, castors, machinery, etc. Howard T. Scott and John A. Stewart of Philadelphia and L. L. Kieth, Glen Olden, Pa., are named as incorporators.

Work has begun on the addition to the plant of the American Wire Fabrics Company, Mt. Wolf, Pa., manufacturer of wire screening, which when completed will double its capacity. The extension to the present structure will be 80 x 200 ft. A tower, 36 x 42 ft., and an engine house will also be constructed.

The contract for the fourteen-story addition to the Arcade Building, Broad street below Market street, has been awarded to Irwin & Leighton. It will be 86 x 101 ft., and is to be erected for the Arcade Real Estate Company, which represents the Pennsylvania Railroad Company.

S. M. Green & Co., architects and engineers, Springfield, Mass., have been receiving bids for a one-story brick and concrete mill building, 132 x 142 ft., to be erected for the Susquehanna Silk Mills at Northumberland, Pa. Particulars are not available, but it is understood that the boiler equipment has been reserved.

A permit has been issued to Edward Cunningham for the construction of a one-story machine shop, 56 x 186 ft., at 222 to 226 North Twenty-first street, for the Manufacturers' Real Estate Company. Information as to the concern occupying the new shop is not available.

Fire badly damaged the plant of the Gloucester Ice Company, Gloucester, N. J., on June 24. Plans of the company as to rebuilding the plant have not been formulated. The loss is said to have been $100,000.

Plans are in progress by Carl P. Berger, architect, for a dyeing plant to be erected at Delaware River and Willner street for the Helwig Silk Dyeing Company. The plans call for a brick and concrete dye house, two stories, 100 x 200 ft., and a one-story power house, 90 x 90 ft. The company will require a steam heating plant, pumps and other general equipment. The architect will be ready for bids in the near future.

Bids will be asked of seventeen electric equipment companies for remodeling the Chambersburg, Pa., electric light plant.

Chicago

CHICAGO, ILL., June 30, 1913.

Except for the steady and very satisfactory continuance of inquiries and orders from the general manufacturing trade for one and two tools at a time, the period of midsummer dullness appears to have been inaugurated with its usual lack of features. The railroads, while not prominent in the market at this time, are engaged in extensive shop enlargements and improvements. The Illinois Central has under way large car and machine shop projects at Memphis; the Chicago, Rock Island & Pacific is establishing enlarged facilities at Des Moines; the Chicago & Alton is pushing forward the building of its Bloomington shops, and the Elgin, Joliet & Eastern is about ready to occupy its $300,000 shops at Joliet. A large number of branch line roads are also adding to their terminal roundhouse and shop equipment. The lockout established in Chicago by the Building Construction Employers' Association against the union workmen in the building trades, together with scattered labor difficulties in machine shops and foundries, is causing considerable disturbance in local operations. The efflux of men to the harvest fields has also produced a distinct labor shortage in various directions.

The Western Cartridge Company, Alton, Ill., is planning to have the addition to its plant, which is now in course of construction, completed by August 1. The intervening time will be required for the installation of transmission equipment and machinery.

The Wisconsin Foundry Company, Racine, Wis., is building a new pattern shop which will provide facilities for general pattern work as well as for the development of special lines.

The Howell-Gilmore Mfg. Company, Lomax, Ill., has been organized with a capital stock of $50,000 to manufacture farm implements by John R. Howell, Grace F. Howell and Hugh B. Gilmore.

The Gray Pneumatic Gear Shift Company, Chicago, has been organized in the office of Edward E. Gray, attorney, 137 South LaSalle street, with a capital stock of $1,000,000, to manufacture automobiles.

The Ideal Machinery Company, Chicago, is the corporate name under which Thos. J. Conley, John L. Walsh, 2703 North Francisco avenue, and Jas. J. Walsh will engage in the machinery business with a capital stock of $2500.

The Automatic Sewing Machine Company, Elgin, Ill., has just completed arrangements whereby it will build a 40 x 130 ft. two-story building to cost $10,000

The Moline Auto Company, Moline, Ill., will build an addition to its plant, 40 x 165 ft., for the purpose of increasing its machine shop capacity.

W. L. Boutelle, city clerk, Galesburg, Ill., will receive bids until July 7 for two 150-hp. boilers.

The board of trustees, Benkelman, Neb., will receive bids until July 8 for a waterworks plant.

Windom, Minn., has voted $15,000 bonds for electric light day service.

The Enterprise Windmill Company, Sandwich, Ill., has sold its plant, including building and real estate, to the Sandwich Mfg. Company, which will handle the windmill, tower, tank and corn slicer departments. The float, flush and horizontal check valve, ratchet die stock and pipe vise business, including all patents, patterns, stocks, etc., has been taken over by D. A. Hinman & Co., of Sandwich.

The L. Wolff Mfg. Company, Chicago, manufacturer of plumbing supplies, has augmented its present property holdings by the purchase of an adjoining tract, 124 x 360 ft., in preparation for the building of additions to its plant.

Plans are being prepared at Minneapolis, Minn., for the enlargement of the city filtration plant and the extension of the water system, which will involve an estimated expenditure of $500,000.

Milwaukee

MILWAUKEE, WIS., June 30, 1913.

Torrid weather has taken the snap out of business generally, and machinery production in this district has shown a falling off, for humane reasons. The quiet tone of the past two weeks continues, and little new business has been booked. Machine tool builders, particularly, are rather gratified at this condition, for it is enabling them to make further progress in the direction of catching up with deliveries.

The International Steel Construction Company, Waukesha, Wis., has increased its capital stock from $10,000 to $50,000. The company was organized recently by interests identified with the Modern Steel Structural Company of the same place and is working on several large contracts in the Lake Superior region.

The Beijer Hydraulic Transmission Company, Stevens Point, Wis., is engaged in manufacturing several models of its hydraulic transmission for automobiles and motor trucks and intends to equip a shop after the models have been exploited and contracts booked. At present no equipment will be required, the work being done in Stevens Point machine shops. A. P. Beijer is president of the company.

The Killen-Walsh Mfg. Company, Appleton, Wis., which recently concluded exhaustive tests of tractors and traction engines designed by William Strait, has decided to begin the production of tractors and trucks at once. The company has leased several buildings of the Coated Paper Company, but plans to build early next year.

The division of bridges of the department of public works, Milwaukee, will soon call for bids for the construction of a new bridge over Milwaukee River at Buffalo street. It will be of the bascule type and cost in the neighborhood of $175,000. Fred G. Simmons is commissioner of public works.

The Luther Grinder Mfg. Company, Milwaukee, has increased its capital stock from $100,000 to $200,000 and will use the additional issue for extensions to its works. The company has purchased the property at 285 South Water street for $60,000 and will remodel the factory building there, five stories and basement, 50 x 140 ft., as well as build a large addition. The original quarters in the Stroh Building were outgrown six months ago, and the factory at 247-253 Madison street was leased temporarily. It is now the intention to house the entire operations under one roof.

The department of public works, Milwaukee, will receive sealed bids until July 9 for one 12,000,000 gal. pumping engine for use at the North Point pumping station of the municipal waterworks system. The estimated cost is $75,000. This contract has been in abeyance for some months.

Fairbanks, Morse & Co. have established a branch warehouse and office for marine engines and appliances at Green Bay, Wis., under the management of Carl Hansen. The former Hartman-Greiling warehouse at Howard and Pearl streets is being used.

The Herman Schmidt Construction Company, Green Bay, Wis., has been organized by Herman Schmidt, A. H. Schmidt and Maria Schmidt. The capital stock is $20,000.

The Milwaukee Yacht & Boat Company, Milwaukee, has increased its capital stock from $25,000 to $75,000. Important extensions, plans for which are not ready for publication, are to be made in the last half of the year.

L. C. Muench and F. C. Luchti of Stoughton, Wis., have organized the Stoughton Novelty Mfg. Company, and are equipping a small shop for the production of all kinds of metal and cloth novelties.

The plant of the Prescott Company, Menominee, Mich., has been placed on a 24-hr. schedule for the speedy execution of the big order recently booked, for the entire sawmill equipment of the new mill of the Puget Sound Mills & Timber Company at Port Angeles, Wash. It will require 125 cars to transport the finished product. The power units will be built by the Nordberg Mfg. Company of Milwaukee.

The National Brake & Electric Company, Milwaukee, has been granted a permit to build a $100,000 foundry addition, details of which were announced some months ago.

The board of education, La Crosse, Wis., is contemplating the erection and equipment of a central heat, light and power plant for the high school and a nearby ward school, to cost not more than $5000.

The Hans Motor Equipment Company, La Crosse, has awarded all construction contracts for its new factory building to cost $25,000 and is figuring for equipment and tools for delivery on September 1.

The Challoner Company, Oshkosh, has just made a large shipment of machinery to Hong Kong, China, for the equipment of a saw and planing mill being erected for a Chinese lumber company.

The Milwaukee Forge & Machine Company, Milwaukee, Wis., has been incorporated with a capital stock of $8000 by John Eckert, Charles Hartson and George B. Pillar.

Detroit

DETROIT, MICH., June 30, 1913.

June has been rather a poor month, judging from reports received from local merchants; business has been irregular and the volume transacted shows a decrease from that of the preceding month. The past week has been a quiet one, with a featureless market, business being confined to small transactions. Of course some let-up in business is expected at this season of the year, but the dearth of inquiry at present is more pronounced than usual. A fair demand exists for some types of special equipment and as well for second-hand machinery of the better grade. Business in the foundry trade is reported to be picking up again and orders received by the steel castings plants are especially pleasing. Several large propositions in construction work are being figured on and contracts have been let on a number of industrial plant extensions this week.

The Hupp Motor Car Company, Detroit, has filed amended articles of incorporation increasing its capital stock from $750,000 to $1,000,000. The action was taken to provide for the extension of the company's factory equipment and to provide for the general expansion of the business.

The Michigan Smelting & Refining Company, Detroit, has let the general contract for the erection of an additional factory building. The company's plant is at Hamtramck, a Detroit suburb.

The plant and equipment of the bankrupt Warren Motor Car Company, Detroit, were sold at receiver's sale, June 26, to Charles F. Rands, of the Rands Mfg. Company. The plant will be utilized by the purchaser for the manufacture of automobile accessories.

The village of Highland Park, a Detroit suburb, at a special election June 21, voted favorably on the issuance of bonds as follows: Waterworks extensions, $45,000; sewer system, $116,000; garbage destruction plant, $20,000.

The Michigan Paper Bag Company, Jackson, Mich., is making extensive additions to its plant. An additional story will be added to the main building and a number of new paper making machines will be installed.

The Brunswick-Balke-Collender Company, Muskegon, Mich., is erecting an addition to its machine shop, 78 x 90 ft., one story. The building will be equipped to enable the company to do its own repair work and to build special machinery.

The Mead Cooperage Company, Saginaw, Mich., has acquired a factory site and contemplates the establishment of a mill for the manufacture of coopers' supplies, barrel heads, etc. W. H. Mead is president.

The taxpayers of Olivet, Mich., have voted to bond the village for $15,000 for the construction of a waterworks system.

The plant of the W. T. Davis Company, manufacturing machinist, Comstock, Mich., was destroyed by fire June 12, entailing a loss of $8000. It will probably be rebuilt.

The Heeson Bros. Foundry Company, Tecumseh, Mich., has been incorporated with $45,000 capital stock to take over the foundry plant of Heeson Bros. The incorporators are R. A. Heeson, John Heeson and Frank Nylands. It is stated that some expansion of the plant may be made later.

Henry Banks, Montague, Mich., will erect a sawmill with a daily capacity of 20,000 ft., at that point. Equipment will be required.

The Kawneer Mfg. Company, Grand Rapids, Mich., which has the contract for manufacturing the windshield tubing for the Ford cars, has increased its capitalization from $500,000 to $1,200,000.

Cleveland

CLEVELAND, OHIO, July 1, 1913.

The market is somewhat more active and a better volume of inquiry came out the past week than for some time. The most important new prospect is an Ohio automobile concern that is planning the erection of a plant for the manufacture of automobile parts. It is stated that this company will purchase machinery equipment aggregating about $60,000. Further good business is in prospect for new metal working plants. The placing of some other business for which lists have been out for some time is being held up. Railroads in this territory are at present buying practically no machinery. Makers of sheet metal working machinery are getting a good volume of orders. Ohio plants manufacturing sheet metal products are generally very busy. The demand for second-hand machinery is not active.

The Elwell-Parker Electric Company, Cleveland, manufacturers of storage battery freight and baggage trucks and shop tractors, will shortly begin the erection of a new plant on its present site. The company has received bids for a four-story factory building of brick and steel, 60 x 120 ft. Considerable new machinery will be required, the list of which has not yet been prepared.

The Angell Nail & Chaplet Company will move its plant August 1 from 5407 Sweeney avenue, Cleveland, to much larger quarters in the plant formerly occupied by the American Washboard Company, along the Pennsylvania Railroad near Woodland avenue. The new quarters will provide 15,000 sq. ft. of floor space. The company will be in the market for some machinery equipment, including a lathe, shaper, milling machine and drill press. The company has recently received an order from the Youngstown Sheet & Tube Company, for 48 nail machines, this being in addition to a number of machines placed in the plant a few months ago.

The Porter-Betsch Company, Cuyahoga Falls, Ohio, is buying machine tool equipment for a machine shop and garage.

The Berger Mfg. Company, Canton, Ohio, is in the market for a 30-in. lathe, a 14-in. lathe, a No. 3 milling machine, a 22-in. shaper, a wet tool grinder, a high-speed hack saw and two or three small tools.

The Rotary Mfg. Company has established a plant in the Ohio building, East Second street, Cleveland, for the manufacture of suction sweepers and is buying machine tool equipment.

The Canton Foundry & Machine Company, Canton, Ohio, is completing an addition to its plant, 36 x 100 ft., 3 stories, which will be used for pattern storage and a stock room. Other plant extensions to be started shortly will include a foundry and machine shop. Foundry and machine shop equipment will be required. The company reports a good demand for its drop presses and sheet metal forming machinery. Some good orders have recently been received from automobile builders who are putting in equipment to manufacture automobile bodies. The company has increased its line of sheet metal work machinery by bringing out some sizes larger and smaller than they previously made.

S. A. Haskell, director of public service, Painesville, Ohio, will receive bids until July 8 for a 3,000,000 gal. water purification plant.

The Canton Mfg. Company, Canton, Ohio, has recently added to its plant equipment and increased its capacity 40 per cent. Considerable new machinery, including automatic machinery and cutting dies, has been installed. The company has purchased a site adjoining its present plant and will erect an extension, and increase its shipping facilities.

A new machine shop for the manufacture of automobile parts and for the repair of automoblies will be established in Canton, Ohio, by Emil J. Kaufman and others. The factory building will be erected on Tuscarawas street, near the Pennsylvania railroad.

The S. & M. Rubber Company, which is erecting a new tire making plant in Coshocton, Ohio, will establish a department for the manufacture of steel tire rims.

The Toledo Flanner Boiler Company, Toledo, Ohio, has changed its name to the Toledo Boiler Tank Company.

The Ohio Dye & Tool Company, Toledo, has been incorporated with a capitalization of $10,000 by M. E. Snell, Donald E. McKisson and others.

The Loomis Machine Company, Tiffin, Ohio, has been incorporated with a capitalization of $150,000 by

George D. Loomis, B. Z. Good, William L. Hertzer, E. B. Naylor and D. L. Lott.

The Marleau Packing Company, Toledo, Ohio, has been organized by A. J. Marleau with a capitalization of $50,000 and will erect a vegetable packing plant in that city.

The Warwick Machine Company, Akron, Ohio, has been incorporated with a capitalization of $6500 by Frank A. Owen, Bruce Frederick, A. H. Wagoner and others.

The Engel Automobile Parts & Motor Mfg. Company, Toledo, has been incorporated with a capitalization of $75,000 to establish a plant by W. P. Engel, F. T. Betts and others.

The Pharis Tire & Rubber Company, Columbus, Ohio, has made an agreement with the Board of Trade of Newark, Ohio, to build a plant in the latter city.

The Weidig Foundry Company, Zanesville, Ohio, has been organized with a capitalization of $30,000 to build a plant in that city to take over the business of the former Weidig foundry which was destroyed during the spring floods.

The city of Cleveland is in the market for an electrically driven weighing telpher and transfer cranes for the municipal electric lighting plant. Bids will be received July 10 by W. J. Springborn, director of public service.

The Kinsey Mfg. Company, Toledo, Ohio, maker of automobile parts, will enlarge its plant by the erection of a one-story factory building, 50 x 200 ft., and a warehouse 150 x 200 ft.

A new foundry will be built by the J. H. Kelley Machine Works, Mount Galeon, Ohio.

Cincinnati

CINCINNATI, OHIO, July 1, 1913.

The slackening up in business with local machine tool builders has made it necessary for a number of them to curtail operations. It is also rumored that a few intend closing down for a week or 10 days in July for a general overhauling of their plants. The export trade is slower than usual in showing any improvement, and it is quite probable that the dull period will run well along into August. Boiler and tank manufacturers report a slight improvement in business, but second-hand machinery dealers are doing practically nothing. All kinds of electrical equipment is moving very slowly.

Labor troubles that have handicapped a number of local manufacturers appear to be automatically settling themselves. However, it is currently reported that the moulders have made arrangements to walk out within the near future, although definite demands have not yet been made on employers.

The Cincinnati Pulley Machinery Company will probably have its new factory at Third and Scott streets, Covington, Ky., in full operation before the summer season is over.

It is rumored that the Hess Spring & Axle Company, Carthage, Ohio, contemplates still further extensions to its plant. Details are not yet available.

The Case-Crane Company, Columbus, Ohio, is having plans prepared for an office and pattern shop addition to its plant. The new structure will be of reinforced concrete construction.

The Springfield Railway Company, Springfield, Ohio, expects to make some extensive improvements to its plant, the nature of which is not yet known.

The Cincinnati Mfg. Company, Cincinnati, manufacturer of fly screens and ornamental wire goods, etc., has awarded the contract for a four-story factory building that will be erected on a site on Evans street. Additional equipment will be required.

The Hydraulic Press Mfg. Company, Mount Gilead, Ohio, whose plans were mentioned several weeks ago, has awarded the contract for a manufacturing building to the H. Keenan Company, Mansfield, Ohio.

Klein & Cohn, Cincinnati scrap-iron dealers, contemplate moving to a location at Wade and Baymiller streets.

The American Foundry & Machine Company, Hamilton, Ohio, is building a large addition to its plant at that point.

It is reported that the Hamilton Gas & Electric Company, Hamilton, Ohio, will soon make some additions to its plant.

The Ford Motor Company, Detroit, Mich., will probably establish an assembling plant at Columbus, Ohio. The company already has a large distributing station for its automobiles at that point.

The Baltimore & Ohio Railroad Company expects to install a large pumping station at Washington Courthouse, Ohio.

The Andrew Plocher Sons Company, Dayton, Ohio, succeeds the City Forge & Iron Company, recently reorganized with $50,000 capital stock.

The contemplated additions to the plant of the Portsmouth Steel Company, Portsmouth, Ohio, now seem certain and contracts will be let at an early date.

The Model Steam Laundry, Ironton, Ohio, is making some additions to its plant, for which special equipment will be required.

The new plant of the Crescent Tool Company, Cincinnati, is now nearing completion and will probably be ready for occupancy August 1. The company makes a specialty of dies, metal patterns, etc., and also has a department for developing inventions.

The Stewart Iron Works Company, South Cincinnati, is installing considerable additional machinery in its new factory building which is used for the manufacture of auto trucks.

Power plant and other equipment will be required for the Excelsior Laundry Company, Dayton, Ohio, to be installed in a three-story building now being planned.

The Andrew Jergens Company, Cincinnati, soap manufacturer, will erect a two-story addition to its plant on Spring Grove avenue. Only a small lot of machinery equipment will be required.

Weber, Werner & Adkins, Mercantile Library Building, Cincinnati, are drawing up plans for a twelve-story office building to be erected at Charleston, W. Va., for the Kanawha National Bank, which will require power equipment.

The Central South

LOUISVILLE, KY., July 1, 1913.

Conditions already referred to continue to combine to make the machinery market a little slow. Most of the larger houses are still fairly busy, especially those handling electrical equipment, but all report that many good prospects are holding off, with the intention of doing their buying a little later, if matters turn out favorably to them. There is no apparent let-up, however, in the activity with which industrial progress in Kentucky and the South generally continues, and with the promise of splendid crops, from wheat to cotton, fundamental conditions seem extremely favorable to splendid business a little later on, in spite of the not unnatural tendency to walk circumspectly until the effect of tariff and currency legislation can be seen.

The James Clark, Jr., Electric Company, Louisville, recently sold to the Chicago White Lead & Oil Company, Chicago, individual motor equipment including seven motors, ranking from 10 to 50 hp. The Clark Company will also supply electrical equipment for the Eminence Distillery Company's plant at Eminence, Ky., including an engine, generator, and seven or eight motors.

The Henry Vogt Machine Company reports that it has more business on its books within a radius of 150 miles of Louisville than for a number of years. Among recent contracts are the following: Two 100-hp. water-tube boilers for the city waterworks of Danville, Ky., installed in place of smaller boilers; a 200-hp. water-tube boiler for the new creosoting plant of the Louisville & Nashville Railroad, at Guthrie, Ky.; four 18 ft. x 72 in. high-pressure return-tube boilers, 150 hp., for the new plant of the American Creosoting Company at Indianapolis; a 300-hp. water-tube boiler for the Central State Hospital for the Insane, at Lakeland, Ky.; a 400-hp. boiler set, with down-draft furnaces, for the new repair shops of the Louisville Railway Company.

The Brandeis Machinery & Supply Company, Louisville, has sold to the Hoke Company, Louisville, a Westinghouse air compressor, a No. 5 Simons crusher and a 500-gal. Ajax steam water-pump, and to the J. H. Cahill Company, also of Louisville, a Lidgerwood engine. Both purchasers are contractors.

The Kentucky Utilities Company, which recently acquired the electric light and power plants at Middlesboro and Pineville, Ky., will probably extend one or both of these plants for the purpose of enabling them to supply current for the use of the numerous mines in that section. The offices of the company are at Lexington, Ky.

A boiler head in the powerhouse of the Rugby Distillery Company, Louisville, blew out recently, and it will probably be necessary to replace the boiler.

The Wood Mosaic Company of New Albany, Ind., has let contracts for the additional equipment which will be required in the extension of its sawmill and woodworking plant at Highland Park, Ky. Most of the machinery will come from the Filer & Stowell Com-

pany, Milwaukee, Wis. The boilers will be furnished by a Louisville concern.

Fred Erhart, Norton Building, Louisville, is preparing plans for an addition to the button factory of J. V. Pilcher & Co., Louisville, which will measure 23 x 65 ft. Later on some additional special machinery will probably be required for the equipment of this addition, including lathes, presses, etc.

The Maguire & Comstock Machine Company, Louisville, has been organized by Grover Maguire, Robert F. Comstock and Louis Zettler, for the purpose of manufacturing electric elevators. The company will use the plant of the firm of Maguire & Comstock, 117 North Fourth street, Louisville, for a time, adding more equipment as its work requires. The capital stock is $5000.

A blacksmith shop belonging to L. Norman, Britmart, Ky., was destroyed by fire recently. The shop will be rebuilt and new machinery purchased.

The S. T. Haskew Lumber Company, which was recently organized at Gurley, Ala., will erect a sawmill at that place, and will require the usual equipment of machinery.

M. V. Rogers, El Dorado, Ark., is planning to build a sawmill near that place, and is in the market for the necessary equipment.

The Archer Lumber Company is erecting a hardwood mill at Helena, Ark.

The Horsberger-Munro Lumber Company, Fort Smith, Ark., will erect a sawmill at St. Landry, Ark., and may be addressed with reference to its machinery requirements.

The Homochitto Lumber Company, Bude, Miss., is making preparations to install a shingle mill at that place. It is understood that most of the machinery has been purchased.

The Horsberger-Munro Lumber Company, Fort Smith, Ark., will erect a large sawmill at Darboone Spur, Ala., on the Opelousas Gulf & Northeastern Railroad. The mill is intended to cut pine, cypress and other hardwoods, and the requisite machinery will be purchased.

The Sanford-Day Iron Works, Knoxville, Tenn., is having plans prepared for a new shop, 66 x 256 ft., ironclad, with brick foundation, galvanized iron roof and sides, which will increase its output of steel, mine and industrial cars, tipples, sheet iron work, etc.

The Rockport Coal Company, Rockport, Ky., which has been considering the construction of waterworks, has postponed action because of a hitch in securing a franchise.

Birmingham

BIRMINGHAM, ALA., June 30, 1913.

Outside of the closing down of several furnace plants and a let up in foundry operations, activities calling for machinery and machine tools are more pronounced than usual at this season. A fair trade is steadily maintained, especially with railroad and building contractors and mining and hydroelectric operations.

The Floyd Bagging Mills, Savannah, Ga., has been incorporated with an initial capital stock of $50,000 to manufacture cotton bagging, etc. T. H. Floyd, M. H. Floyd and T. H. Floyd, Jr., are the incorporators.

The Grovania Oil & Fertilizer Company, Grovania, Ga., contemplates improving its factory.

E. E. Kelly and Henry King are erecting buildings for a cotton seed oil mill at Opp, Ala., which is to cost $30,000.

M. G. Hoffman, Merrill, Ill., has purchased a tract near Pensacola for the purpose of establishing a factory for the manufacture of excelsior. An equipment of 24 knives is planned.

The Empire Cotton Oil Company, Cordele, Ga., will establish a fertilizer mixing plant at a cost of $20,000.

The National Mosaic Flooring Company, Mobile, Ala., has been purchased by the Indiana Mosaic Flooring Company, which will expand operations. The present plant has a capacity of 15,000 tiles per day.

The J. G. Loyless Gin Company, Blakeley, Ga., has been incorporated with an initial capital stock of $7000 by J. G. Loyless, H. Grady Smith and others.

The Consumers' Ice Company, St. Augustine, Fla., has completed arrangements for establishing an ice factory. Wells will be sunk to secure water. Amos W. Corbett is president.

L. D. Boykin, Creighton, Ala., will establish a sawmill in place of the $11,500 mill that was burned.

The City Commission of Sylavauga, Ala., has granted a franchise to M. B. Lewis and T. B. Perry to build and operate an electric railway. A company with a capital stock of $150,000 will be formed.

C. P. Matthews will re-establish a sawmill near Douglass, Ga., recently burned.

The Pelham & Havana Railroad will establish shops at Cairo, Ga., the road now operating between Pelham, Ga., and Havana, Fla.

S. T. Haskew, South Pittsburg, Tenn., heads a company being organized to establish a lumber manufacturing plant at Gurley, Ala.

The Rockey Creek Lumber Company will establish a lumber plant at Pansy, Ala., in place of one that was burned.

Machinery for the new municipal electric light system and water works for Newberry, Fla., will be bought immediately. Included in the requirements are one 80-hp. high-pressure boiler, one 50-kw. generator with switchboard, exciter and street-lamp regulator, generator to be connected to a 100-hp. high-speed automatic engine, transformers, street-lamp equipment, etc. The plant will be built by the J. B. McCrary Company, Third National Bank Building, Atlanta, Ga.

J. D. Edmundson, mayor, La Grange, Ga., will receive bids until July 8 for a municipal water gas plant.

The city of Ellijay, Ga., will expend $25,000 in installing waterworks and an electric lighting system. Plans have been drawn by the J. B. McCrary Company, Atlanta, Ga.

T. J. D. Lamar, Dan Lott, R. T. Hitch and associates, Waycross, Ga., have made application for the incorporation of the Georgia Oil & Disinfectant Company, with a capital stock of $5000, to manufacture oils and paints.

Wheeling

WHEELING, W. VA., June 30, 1913.

The contract has been let by the Parkersburg Rig & Reel Company, Parkersburg, W. Va., to R. M. Brown for the construction of a new plant. New machinery will be installed.

K. B. Stephenson and R. B. Cutter have purchased from Frank Mohr the Mohr-Minton Mines brick plant at McArthur, Ohio, and will spend $120,000 in making it one of the most modern brick plants in the country.

The Tri-State Foundry & Machinery Company, New Cumberland, W. Va., has been incorporated with $50,000 capital by Nathan Jacobs, Thomas J. Shaw, Robert M. Traney, of Toronto, Ohio; Andrew M. Shelton and Fred Graham, of New Cumberland, W. Va.

The Suttor Roofing & Cornice Company, Clarksburg, W. Va., has moved into its new two-story plant, 40 x 120 ft., and installed considerable new equipment.

The Weirton Plate & Structural Company, headed by Alfred Tompkins, of Pittsburgh, will build a plant at Weirton, W. Va.

The $25,000 bonus necessary to bring the General Porcelain Company's plants from East Liverpool, Ohio, and six other cities to Parkersburg, W. Va., has been raised among the business men of the latter city and the removal of the plants is now assured.

The Davidson & Stevenson Porcelain Company has been incorporated with $25,000 capital to build a plant at East Liverpool, Ohio, by Willis Davidson, H. L. Stevenson and E. T. Davidson.

The Smith-Hudson Company, Charleston, W. Va., has been incorporated with $10,000 capital to manufacture electrical devices and do a general electrical business. The incorporators are J. A. Hudson, N. R. Hudson, C. M. Vickers, F. C. Smith and L. M. Smith.

St. Louis

ST. LOUIS, MO., June 30, 1913.

The machine tool market at this point, while reflecting the natural summer conditions, is not at all pessimistic so far as relates to the general outlook. A good amount of business, all things considered, continues, and the crop outlook, improved by the recent rains, is seemingly a stronger influence in this section than the tariff sentimentality. Second-hand tools continue in better demand than the supply. Collections are fairly good.

The Union Electric Light & Power Company, St. Louis, has secured additional [illegible] joining its Tenth

S. DIESCHER & SONS,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

street plant and will make improvements to increase its reserve plant equipment. Definite plans have not been completed.

The city of St. Louis has plans for about $2,000,000 of waterworks extension expenditure the coming fiscal year.

The Duenweg Waterworks Company, Oronoco, Mo., has been incorporated with a capital stock of $15,000 by D. D. Molloy, A. S. Raymond and E. F. Cameron, and will equip a public service water plant.

The Farmers' Elevator Company, Urich, Mo., has been incorporated with $14,000 capital stock by E. W Hall, W. B. Collins and C. O. Hill, and will equip a grain elevator.

The Avery Scale Company has been authorized to use $125,000 of its capital in a branch plant at Kansas City, Mo.

The Howell-Gilmore Mfg. Company, Lomax, Ill., has been incorporated with $50,000 capital stock by John R. and G. E. Howell and Hugh B. Gilmore and will equip a manufacturing plant.

The plant of Swift & Co. of Chicago, at Harvey, La., is to be enlarged and new equipment added to the packing and the cooperage plants.

The plant of Armour & Co., of Chicago, at Hammond, Mo., is to be equipped for electrical operation, the total requirement being 600 horse power.

A. M. Wooten of Memphis, Tenn., has plans for a clay tile plant to be built by him on property owned in Mississippi. He is in the market for the necessary machinery.

The Lyle Rock Brick Company, of Kansas City, Mo., will rebuild the rock crushing plant recently destroyed by fire with a loss of $10,000.

The Oklahoma Concrete Silo Company, Oklahoma City, Okla., has been incorporated with $15,000 capital stock by E. W. Lingee, S. H. Ingham and C. A. Henderson and will equip a plant to manufacture concrete staves.

The Citizens Ice & Public Utility Company, Junction City, Arkansas and Louisiana, is building a four system cotton gin and will also install new equipment in fertilizer, ice, electric and cold storage plants which it has acquired. R. G. Brown is president.

Lee Curry, E. F. Bellinger and A. C. Baker, of Altus, Okla., have incorporated the Farmers' Cooperative Gin Company with $12,000 capital stock and will equip a ginnery at once.

A cotton gin is to be equipped at Marlow, Okla., by the Everybody's Gin Company in time to handle this season's crop.

The Russellville Cotton Oil Company, Russellville, Ark., recently organized by W. H. Rankin and others, is reported ready to buy equipment for a cotton seed oil mill.

The Imperial Cotton Oil Company of Macon, Miss., will rebuild and re-equip that part of its plant recently burned with a loss of $10,000.

The Piggott Power Company, Piggott, Ark., recently incorporated with $25,000 capital, has bought the plant of the Piggott Light & Power Company and will remodel its electrical equipment.

The city of Albany, Mo., which is, as reported, to expend $19,000 on its electric light plant, will add 200 horse power and is ready for bids. Rollins & Westover, Kansas City, Mo., are the engineers.

The Arkansas Fertilizer Company, Little Rock, Ark., whose plant at Argenta, Ark., was burned recently, will rebuild and will locate the new plant at Little Rock or Memphis. It will be electrically operated. Fred Mayer of St. Louis is vice-president and H. M. Bennett of Little Rock, Ark., president. It is in the market for the machinery required, including crushers, mixers, elevators, conveyors, motors, etc.

The Stuttgart Foundry & Machine Company, Stuttgart, Ark., has been incorporated with $15,000 capital stock by J. E. Brown, Starling White and others and has acquired the Rousch-White plant which it will remodel.

The Chickasha Drilling Company, Chickasha, Okla., has been incorporated with $15,000 capital by C. E. Ross, Dennis O'Brien, C. W. Duncan and others and is in the market for drilling equipment to be used in contract work.

The Cushing Refining Company, Cushing, Okla., recently incorporated with $100,000 capital stock by H. N. Evans, O. G. Lee and E. D. Ellison, all of Kansas City, Mo., is reported in the market for equipment.

The Burns Drilling Company, Okmulgee, Okla., has been incorporated with $16,300 capital stock by Jos. Brown, J. L. Fuqua, A. D. Cochran and others and will buy drilling equipment to be used on contract work.

The trustees of the state charitable institutions of Arkansas, with offices at Little Rock, will install an ice plant at the Confederate Home, the equipment to cost $3000.

The Crystal Ice Company, Paragould, Ark., will receive bids until July 15 for equipping an addition to its plant.

The Etowah Water & Ice Co., Etowah, Tenn., has plans for the installation of a 10-ton ice plant.

The Gap Lumber Company, Caddo Gap, Ark., has increased its capital from $20,000 to $30,000 and will increase its equipment.

The H. W. Cooper Lumber Company, Eldorado, Ark., will install a saw and planing mill of 25,000 ft. daily capacity.

B. B. Young, Gurdon, Ark., has plans for a planing mill to be added to present sawmill equipment.

The C. G. Griffin Lumber Company of Kingsland and Rison, Ark., recently incorporated with $25,000 capital, will equip a mill with 25,000 ft. daily capacity.

The Kern Company, New Orleans, La., has plans for a stave mill of considerable size in Evangeline Parish.

R. A. Honsberger, Fort Smith, Ark., has plans for a circular saw mill in St. Landry Parish, La., and will install a band mill later.

The Ponchatoula Lumber Company, of Ponchatoula, La., has been incorporated with $10,000 capital stock and will equip a mill. M. F. Tucker, Rudolph Flasdick and Paul H. Menard are the stockholders.

C. E. Lewis and others, operating as the Southern Ornamental Fence Company, will equip a plant at Oklahoma City, Okla., for the manufacture of ornamental metal fencing.

J. R. Piles and S. J. Ellis of Joplin, Mo., and L. S. Durham of Carthage, Mo., and Jones Bros. of Columbus, Kan., are reported in the market for equipment to develop forty acres of mining land at Galena, Mo.

The Grasselli Chemical Company, Cleveland, Ohio, is reported to be in the market for equipment to operate forty acres of mining land near Joplin, Mo., chiefly zinc.

E. St. G. Noble and others of Galena and Joplin, Mo., are in the market for equipment to operate mining land near Galena, Mo.

O. Longacre, Jr., and C. T. Chapman of Joplin and Temple Chapman of West City, Mo., have incorporated the Longacre-Chapman Mining Company, Joplin, with $56,250 capital stock, and will equip property they own for immediate development and operation.

The Van Hoose Mfg. Company, Joplin, Mo., has increased its capital from $50,000 to $200,000 and will add to its equipment and capacity at once.

P. W. Samuel and others of Muskogee, Okla., are equipping a plant for the manufacture of platinum.

The Grantfield Elevator Company, Grantfield, Okla., has been incorporated with $15,000 capital stock by R. L. Owen and U. S. Brasswell to equip a grain elevator at that point.

The Independent Rubber Company, Joplin, Mo., has been incorporated with $10,000 capital stock by J. L. and J. H. Coesir and B. H. and F. A. Wilbur and will equip a rubber manufacturing plant.

The Electric Depositing Company, St. Louis, has plans for a factory requiring $6000 of equipment to be established at 2206-2208 Wash street.

The National Camera Company, 903 Lucas avenue, St. Louis, will equip a plant to manufacture cameras. C. J. Shea is president.

A glass manufacturing plant is to be equipped at Sand Springs, Okla., by the Sand Springs Glass Company, recently organized.

The recently reported plans for the Nonconnah yards at Memphis, Tenn., of the Yazoo & Mississippi Valley Railroad, will involve an expenditure of $750,000 for air plant, waterworks, machine shop, round-house, etc.

Monroe City, Mo., is ready to begin work on its $78,000 water and sewer plant recently authorized. The requirements include pumping machinery, engines, an electric generator, etc.

J. O. Nelson and C. L. Henderson will add $10,000 of equipment to the waterworks at Harrison, Ark., including considerable pumping machinery.

Plans of R. C. Huston & Co. of Memphis, Tenn., engineers, have been accepted by Walnut Ridge, Ark., for a $40,000 waterworks plant. Bids are to be asked at once.

The city of Jackson, Miss., will construct a pumping station with accessories, including motor-driven centrifugal pumps and cross compound engines, at a total cost of $165,000. M. L. Cully is city engineer.

The Seavey Spoke & Felloe Company, Seavey, Ark., will remove a plant from Irondale, Mo., and remodel it before beginning operations. S. H. Wright, E. A. Ford and T. A. Watkins are interested.

The planing mill of W. L. Garner at Chickasha, Okla., is reported burned with $25,000 loss. Replacement at once is the present plan.

The State Capitol Building Commission at Jefferson City, Mo., is ready for bids for the power and lighting and heating plants for the new $3,000,000 capitol building.

Pascal Meaut, chairman of the lighting committee, Biloxi, Miss., will receive bids until July 15 for a lighting plant.

The Tuller Mfg. Company, Kansas City, Mo., manufacturer of disk harrows and cultivators, has purchased a site at Thirteenth and Charlotte streets, North Kansas City, on which it will erect a new plant. Work is expected to begin at once.

The Petrous Mfg. Company, manufacturer of rust, rot and fireproof building material, fire brick and roofing, has moved its plant from Biloxi to Hattiesburg, Miss., where a new plant will be put in operation in July. The company recently increased its capital stock from $60,000 to $100,000. J. S. Love is secretary and treasurer.

The Allin Machine Works, Helena, Ark., will enlarge its buildings and add to its equipment and will change its name to the Modern Machine Works.

The new factory of the Medart Patent Pulley Company, 3505 DeKalb street, St. Louis, was destroyed by fire. The damage is estimated at $15,000.

The Pacific Coast

PORTLAND, ORE., June 24, 1913.

Tentative inquiries for machine tools are fairly numerous, and considerable business is being figured, giving promise of an active movement as soon as the expected betterment takes place in the financial situation. Meanwhile buyers are strongly disposed to delay the placing of orders on installations of any magnitude and, aside from a fair business in single tools, the market remains quiet. Some large tools are being ordered for the Puget Sound navy yard, but this business has been of no great interest to local merchants.

The market for general machinery is holding up as well as could be expected. It is reported that there will be some delay in carrying out new hydroelectric developments, but otherwise there has been little curtailment, and small business of a routine nature for repairs and replacements in lumber and manufacturing plants is quite active. Many logging camps are preparing for a short suspension of operations in July, when a large amount of overhauling will be done, and orders are coming out well for new lumber mills. Crop conditions in both fruit and grain districts of the north Pacific States are highly satisfactory, and a good volume of general business is coming from the interior.

The planing and shingle departments of the Sultan Lumber Company, Everett, Wash., were recently destroyed by fire. The loss was well covered, and it is announced that the equipment will be replaced at once.

The Seattle Construction & Drydock Company has received the expected contract to construct the naval submarine tender Bushnell. This company also presented the lowest bid for nine steel coal barges for the Puget Sound navy yard, to cost $120,000. This company has secured an option on an 85-acre site across the Sound from Seattle, at Eagle Harbor.

M. F. Brady, formerly Oregon representative of the Hofius Steel & Equipment Company, Seattle, Wash., has started in the railroad equipment business independently, under the name of M. F. Brady & Son, with offices at 1325 Yeon Building, Portland.

The car shops of the Denver & Rio Grande Railroad, Salt Lake City, Utah, were destroyed by fire on June 18, with an estimated loss of $250,000.

A. L. Bratton, vice-president of the Portland Machinery Company, Portland, which handles several important lines of machine tools, is spending the month on a visit to the manufacturers.

The town of Condon, Ore., has let contracts for the construction of a power and water plant, Fairbanks, Morse & Co. securing the machinery contract.

The Nisqually-Russel Car & Machinery Company, Tacoma, Wash., has been incorporated as a consolidation of the Nisqually Iron Works, Tacoma, with the Russel Wheel & Foundry Company, Detroit, Mich. A. G. Brown, formerly manager of the Nisqually Iron Works, continues as manager.

The city of Tacoma will receive bids this week for a lot of sub-station equipment, including six 1500-kw. transformers, switchboard equipment, circuit breakers, etc.

The Grays Harbor Lumber Company, Hoquiam, Wash., is preparing to install a 500-kw. Curtis turbo-generator, with transformers, switchboard equipment, etc.

The Willapa Lumber Company, Raymond, Wash., has doubled its power plant, having now 750 hp., and has installed a number of new machines.

The Spaulding Logging Company, Salem, Ore., has installed a new 450 hp. Allis-Chalmers engine.

It is announced that the Puget Sound Cement & Lime Company, recently organized at Seattle, Wash., will build a 3000-bbl. cement mill in that city, with a large crushing outfit on Orca Island.

It is reported that Mangat Rai, a cotton planter of India, who has just arrived in San Francisco, intends to take figures in this country on machinery amounting to about $1,000,000.

The City Council of Palo Alto, Cal., has authorized the purchase of a Diesel engine and an electric generator for the municipal light and water plant at a cost of about $27,000.

The Eccles & Smith Company has recently taken orders for the entire garage equipment of the Haynes Auto Sales Company, and for the shop of Rene Marx, agent for the German Mercedes Company, this city. Both outfits are heavier and more complete than the average garage equipment.

The town of Palo Alto, Cal., has placed orders for a Koerting Diesel engine and a 250 kva. Fort Wayne generator.

The Sutter Basin & Improvement Company has placed orders for the construction of a dredge, to cost about $90,000, said to be larger than any dredge now operating in the Sacramento River district.

Eastern Canada

TORONTO, June 28, 1913.

Warwick Bros. & Rutter, 401 King street West, Toronto, are erecting a large addition to their premises, which will give them greatly added capacity for their output of various lines of stationery.

The Belgo Canadian Pulp & Paper Company, Ltd., Shawinigan Falls, Que., which recently purchased 500 square miles of timber, reports that it intends to erect a sulphite plant to operate upon the raw material thus secured. A new building will also be erected by the side of the present plant, to house two more paper machines, which the company intends to add to its equipment.

Sir Thomas Shaughnessy has issued a statement to the effect that the Canadian Pacific will spend $100,000,000 the coming year on extensions, hotels, terminals, steamers and rolling stock, rendered necessary by the expansion of the company due to the increasing growth and demands of the Dominion.

The Canadian Kodak Company, Toronto, has purchased 25 acres of land on Eglington avenue, near the Weston road, as a site for the large factory required by the expansion of its business on this side of the line. It is understood that within a year and a half $1,250,000 will be spent on buildings to be erected on the property, and S. B. Cornell, assistant manager of the company, states that if the business continues to increase at the present rate over 1000 men will be employed at the proposed factory within three or four years.

Darling & Brady, Ltd., Montreal, has been incorporated with a capital stock of $100,000 by David J. M. Darling, Morton Darling, George H. Baker, and others to carry on the business of soap manufacturers.

Delany & Pettit, Ltd., Toronto, has been incorporated with a capital stock of $300,000 by Charles Delany and Howard S. Delany, manufacturers, of Philadelphia, Charles S. Pettit and John H. Pettit and others of the city of Toronto, to manufacture builders' supplies.

Drummond, McCall & Co., Ltd., Montreal, has been incorporated with a capital stock of $1,000,000 by Arthur W. P. Buchanan, Thomas S. Owens and others to manufacture engines and engine parts.

The Oil Motor & Mfg. Company, Ltd., St. John, N. B., has been incorporated with a capital stock of $150,000 by Edward J. Broderick, Albert E. Massie and others.

The Beaver Lumber Company, Ltd., Toronto, has

been incorporated with a capital stock of $75,000 by Robert J. Christie, Ernest Constant and William S. Thomas.

The Dudley Re-Action Engine Company, Ltd., Sault Ste. Marie, Ont., has been incorporated with a capital stock of $100,000 by Job Dudley, Archibald A. McNabb and Alexander D. McNabb to manufacture engines.

Steps will be taken to enlarge the Toronto water works plant so that it will supply 100,000,000 gals. to the city daily instead of 40,000,000 as at present.

Plans for the incinerator and garbage reduction plant to dispose of the waste matter in Toronto are being prepared by the street commissioner and medical officer of health, who recently inspected United States plants. An appropriation of $1,000,000 was voted for the plant at the last elections by the ratepayers. Construction will commence as soon as the plans are ready.

The agreement with the Canadian Flax Mills, Ltd., St. Catharines, Ont., sets forth that the company will acquire land on Lincoln avenue, to erect thereon factory buildings, which with the plant, will cost $150,000 and be ready for opening by June 1, 1914.

The Armstrong Cork Company, St. Catharines, Ont., will locate outside the city limits in Grantham. It will have fourteen acres of land, and will erect buildings worth $75,000.

The Ontario Government is building a brick and tile factory immediately north of the Canadian Pacific Railway tracks at Memico, Ont., with an estimated output of 10,000,000 bricks a year.

The Trans-Continental Power Company, Ltd., Toronto, has been incorporated with a capital stock of $10,000 by Richard Wyllie Hart and others to carry on a general power business.

The by-laws to loan the Hewetson Shoe Company, Toronto, $20,000, and the Hough Lithographing Company, Toronto, $15,000, were carried by the ratepayers of Brampton, Ont. The companies will erect factories there this summer.

Work will be commenced next week on the Transcontinental car shops at Quebec. Although these shops will not be as extensive as those at Winnipeg, they will be among the finest on the continent, costing about $1,560,000. The buildings are located so as to allow for future expansion. They will be built by the Transcontinental Railway Commission, Ottawa, Ont.

Frederic Nicholls, president of the Canadian General Electric Company, Peterborough, Ont., draws attention to the fact that the Canadian Pacific Railway has authorized the electrification of its line between Castlegar and Rossland. The contract for the necessary electrical machinery has been let to Mr. Nicholl's company. It is the intention to use 2400 volts on a direct current trolley system. George Bury, one of the vice-presidents of the Canadian Pacific Railway, says that the electrification of all its lines in the Rocky Mountains will depend upon the results presently to be obtained.

The Vermont Marble Company, Proctor, Vt., is having plans prepared for a Canadian branch factory which it will build at Peterborough, Ont. The building will be 64 x 212 ft., one story.

The Barker Foundry Company, Ltd., Brighton, Ont., has been incorporated with a capitalization of $100,000 to take over D. J. Barker & Co., Pictou, Ont. A new plant is being built by the company for the manufacture of stoves and for general foundry business.

Plans have been completed for a new factory to be erected by Farquharson & Gifford, Stratford, Ont., manufacturers of upholsterers' supplies.

Bids were received this week by the water power and light commission, Orillia, Ont., for the construction of a reinforced concrete receiving basin, pump house and the furnishing of a 150-hp. boiler, pumping machinery, electric equipment, gate valves, etc. E. Long is chairman of the commission.

The tanning and leather manufacturing plant of Wickett & Craig, Ltd., Toronto, Ont., which was extensively damaged by fire recently, is to be rebuilt at once. Nearly all of the machinery was destroyed, the loss on plant, machinery and stock being over $300,000.

The Massachusetts Saw Works, Springfield, Mass., will locate a branch factory at Hamilton, Ontario, which will be known as the Victor Saw Works, Ltd. The Hamilton plant will be operated as an entirely separate industry. A two-story building has been leased, which will be thoroughly renovated, making it the most efficiently designed and thoroughly equipped saw works in Canada. When running at full capacity this factory will employ 75 men, principally skilled mechanics. J. W. McQuillan, formerly connected with the Massachusetts Saw Works in an executive capacity, is president, and Harold G. Strout, formerly sales manager for the Massachusetts Saw Works, is vice-president. The secretary-treasurer is E. S. Bradford, Jr., of the same organization.

Government Purchases

WASHINGTON, D. C., June 26, 1913.

The paymaster-general of the Navy Department, Washington, will receive bids July 8 for furnishing navy yard requirements as follows:

Schedule 5574—*Ordnance.*

Class 11, Washington—One electric conveyor.

Schedule 5575—*Construction and Repair.*

Class 21, Portsmouth—One horning press.
Class 21, Alternate—One horning press, delivery f.o.b. works.
Class 22, Portsmouth—One geared open-back power press.
Class 22, Alternate—One geared open-back power press, delivery f.o.b. works.

Bids will be received at the office of the general purchasing agent, Isthmian Canal Commission, Washington, until July 17, for a motor-driven lathe.

The commissioner of Indian affairs, Washington, will receive bids until July 22 for furnishing and installing a central steamheating plant at the Lower Brule Indian School, Brule, S. D. Address the superintendent of the Lower Brule Indian School, Brule, S. D.

The supervising architect of the Treasury Department, Washington, will receive bids until July 25 for a pumping plant, cooled drinking water system, etc., for the post office at Oklahoma City, Okla., and until July 28 for air washers, humidifiers, heating and tempering coils, etc., for the post office at Omaha, Neb.

Bids for furnishing electric traveling cranes for delivery at the Puget Sound navy yard were received by the Bureau of Yards and Docks, Navy Department, Washington, June 21, as follows:

Item 1, price for four cranes complete; 2, deduct from item 1 if the 5-ton 1-motor hand traversing bridge crane is omitted; 3, add to item 1 for one additional 5-ton wall crane; 4, add to item 1 for one additional 5-ton 1-motor hand traversing bridge crane.

Cyclops Iron Works, 837 Folsom street, San Francisco, Cal., item 1, $18,400; 2, $1900; 3, $4400; 4, $1900.

Pawling & Harnischfeger Company, Thirty-ninth street and National avenue, Milwaukee, Wis., item 1, $16,825; 2, $2725; 3, $3950; 4, $2675.

Bids were received by the Department of the Interior, Washington, June 24, for furnishing and installing an addition to the coal and ash handling machinery in the old post office building, Washington, D. C., as follows:

Charles A. Barker, Washington, D. C., for the entire work, $1620, time 60 days; for alternate No. 1, $350; for alternate No. 2, $588.

G. W. Forsberg, Washington, D. C., for the entire work, $2120, time 75 days; for alternate No. 1, $600; for alternate No. 2, $850.

R. H. Beaumont Company, Philadelphia, Pa., for the entire work, $2972, time 120 working days; for alternate No. 1, $477; for alternate No. 2, $1614; for alternate No. 3, $734; for alternate No. 4, $1017.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, June 24, for furnishing navy yard requirements as follows:

Schedule 5527—*Navigation.*

Class 21, San Francisco—One motor-driven milling machine—Compressed Air & General Machinery Company, $990; Garvin Machine Company, $1098; Harron, Rickard & McCone, $1695; Kempsmith Mfg. Company, $1350; Manning, Maxwell & Moore, $1110; Niles-Bement-Pond Company, $1472 and $1008; Pacific Tool & Supply Company, $1075 and $1160.

Class 21, Alternate—One motor-driven milling machine, f.o.b. works—Compressed Air & General Machinery Company, $933; Garvin Machine Company, $1394; Harron, Rickard & McCone, $1575; Manning, Maxwell & Moore, $1040; Niles-Bement-Pond Company, $1328 and $883 (alt.); Pacific Tool & Supply Company, $1010 and $1084.08.

Schedule 5532—*Steam Engineering.*

Class 31, Annapolis—Furnishing and installing one Diesel engine—James Craig Engine & Machine Works, $15,500; New London Ship & Engine Company, $10,500.

Schedule 5538—*Construction and Repair.*

Class 71, Brooklyn—One 20,000-lb. 3-motor electric traveling crane, subject to inspection at place of manufacture—Cleveland Crane & Engineering Company, $3950 and $3770 (alt.); Morgan Engineering Company, $4300; Niles-Bement-Pond Company, $4000 and $3700; Pawling & Harnischfeger Company, $3750; Whiting Foundry & Equipment Company, $5200.

Schedule 5539—*Construction and Repair.*

Class 72, Charleston—One complete gate shear, subject to inspection as place of manufacture—Hilles & Jones Company, $4616, $4795, $4725 and $4765; Kemp Machinery Company, $4948; Manning, Maxwell & Moore, $4975, $5030 and $5035; Niles-Bement-Pond Company, $5598; Wickes Bros., $6237, $6160 and $5835; Manning, Maxwell & Moore, $4035.

Class 72, Alternate—One complete gate shear, subject to inspection at point of delivery only—Bertsch & Co., $6400; Hilles & Jones Company, $4616, $4795, $4725 and $4765; Manning, Maxwell & Moore, $4975, $5030 and $5035; Niles-Bement-Pond Company, $5598; Wiener Machinery Company, $8375; Manning, Maxwell & Moore, $4160.

Schedule 5540—*Construction and Repair.*

Class 73, Furnishing and erecting one 10-ton electric gantry crane at the navy yard, New York—Cleveland Crane & Engineering Company, $10,380 and $10,170 (alt.); Niles-Bement-Pond Company, $11,745; Whiting Foundry & Equipment Company, $12,235.

New Tools and Appliances

This is essentially a news department for which information is invited.

Coach Wheel Lathe.—For turning coach wheels, the Putnam Machine Company, Fitchburg, Mass., has brought out a 42-in. lathe having particularly massive construction. Among the special features of the lathe are the use of self-oiling journal boxes for supporting the main driving shaft, the supply of lubricant being carried up by flat chains, and the use of the builder's non-slip equalizing driving dog and its combination tool slide. The machine is equipped with a single-pulley drive and six mechanical speed changes are provided, either electric motor or belt drive being used. A simple motor-driven mechanism moves the tailstock along the bed through a massive screw and nut, and the movement is stopped when the wheels are in position by an adjustable brake band.

Self-Opening Die.—A new form of self-opening die has been brought out by the Wells Bros. Company, Greenfield, Mass. In designing this die an effort was made to combine the advantages of an opening die which does not have to be backed off the work with the accuracy of a solid one. With this object in view, the chasers were hinged at the back and are supported by a sleeve which engages a tapered section located directly behind the cutting edges, thus giving a solid and unyielding support at the back of the chaser and directly opposite the cutting edges which do the heaviest work. Lateral support is provided on each side of the chasers by the body of the die. An adjustment is provided to take up slight departures from the standard size of the die by which a variation as fine as 0.00025 in. can be compensated for. The releasing springs that open the die operate directly upon the chaser and the tripping mechanism is entirely separate from them. Several different styles of die are made in which a variety of tripping devices are used for securing the automatic opening of the dies.

Round Belt Lacing.—The George W. Southwick Company, 35 Warren street, New York City, has brought out a round rawhide belt lacing, which is made in three sizes. The advantages claimed for this particular form of lacing are that it does away with the necessity of cutting large holes in the belt, thus impairing its strength, while at the same time the lacing does not bunch in such a way as to cause a jump or jerk when the joint passes over the pulley. The rawhide of the lacing is twisted under high tensile strain, into a cordlike form and sufficient tensile strength and ductility are possessed by the finished product to adapt it for belt lacing purposes.

Plier Wrench.—The West Mfg. Company, New Haven, Conn., has recently brought out a drop forged tempered steel plier wrench. One of the features of the tool is a set screw on the arm by which the jaws can be set to any size within the range of the tool, thus giving a convenient form of wrench that will grip and release round material, working like a ratchet. The back strain of the plier arms is taken by the set screw, and when it is required to use the tool as an ordinary pair of pliers the set screw is turned back to where it is entirely out of the way. One of the jaws is milled crosswise, while the other is smooth with a longitudinal groove, which gives a firm grip on the end of a wire. Two sizes of the tool with jaw openings of 1 and 1½ in. respectively are made.

Portable Electric Reamer.—The Hisey-Wolf Machine Company, Cincinnati, Ohio, has recently designed a portable electric reamer for use in boiler shops, structural and steel works, etc. The tool consists of an electric motor with speed reduction gears that drive the socket at the proper speed. Two handles, one long and the other short, are provided on either side of the tool, and a switch is mounted in one of the handles. The motor, which is of the bipolar type, is cooled by air supplied by a fan placed on the rotor shaft close to the gear box. This fan discharges through a series of small openings, which are covered by a plain wire mesh to protect the motor from having borings and other material drawn into it. A compound winding provides a strong starting and operating torque at a low speed and prevents damage from racing when the tool is free. The socket is of the slip type and the reamer can be easily removed by merely unscrewing the knurled cap by hand.

Automatic Motor Controllers.—For the automatic starting of motor-driven machine tools, pumps, fans, etc., the Cutler-Hammer Mfg. Company, Milwaukee, Wis., has brought out a new series relay self-starter, in which it is only necessary to close a knife switch which is mounted between two solenoid switches. In this starter the resistance is cut out of the circuit, and the motor accelerated automatically, the starting current being kept below a safe maximum value. The magnetic switches close in succession, being controlled by the motor current through the relays, so that if the motor starts under a light load it will be accelerated quickly, while if the load is heavy the resistance is cut out more slowly. The type of starter is especially adapted for use where the load varies, as there is no danger of the operator damaging the motor or the driven machine through improper starting. This type of automatic controller is made in capacities up to 15 hp. for use on 230 and 500 volt circuits and up to 7½ hp. for use at 110 volts. A similar type, with the same kind of magnetic switch, is also made with a main line magnetic switch and blowout in place of the knife switch which permits control from a push button, float switch or regulator. This enables a larger controller, which may be placed out of reach, to be used.

A Double Tumbling Barrel.—For handling small metal parts, such as stampings of all kinds, pins, studs, etc., Adolph Muehlmatt, Cincinnati, Ohio, is building a double tumbling barrel, in which the two parts are independent of the other and either one or both can be operated at will. The barrels are about 10 in. in diameter at the large end and taper to about 4½ in. at the mouth, the length being 8 in. There is a triangular vane or rib in each barrel, and in operation the work is carried toward the rear or larger end by the slope of the side, and as the rib swings upward with the rotation of the barrel, it carries the work with it and discharges it toward the front of the chamber, thus giving a continuous helical movement to the work and the polishing material. The driving pulley is located in the center with the barrels at either end and when a barrel is dropped into the horizontal position for operation, a gear on the end of the shaft engages the driving pinion. When the barrel is placed in the vertical position for loading, the gear comes out of mesh, and the barrel is kept in the upright position by a locking pin. The weight of the barrel and the work when in the operating position is not taken by the gear, but by two rollers under the driving shaft. If desired, the barrel can be removed by releasing two thumb screws at the bottom, thus enabling the barrels to be interchanged readily if desired.

Trade Publications

Power Hammers.—Beaudry & Co., Inc., Boston, Mass. Booklet. Describes and illustrates two types of power hammer, one, the Champion, for light and heavy railroad, machine and general job forging with rams weighing from 50 to 500 lb., and the Peerless, which was illustrated in *The Iron Age*, October 3, 1912. This latter hammer is designed for plating, drawing, swaging, collaring, spindle making and general manufacturing, and the ram weighs from 25 to 200 lb. After a brief general description of the two hammers, more detailed ones are given of each with illustrations and tables of specifications, and a partial list of users completes the booklet.

Case-Hardening.—Ideal Case-Hardening Company, 1784 Broadway, New York City. Pamphlet. This is a book of useful information and practical rules on the case-hardening and heat treating of steel, which is now in its fifth edition. In its present form, the book is changed and broadened from the previous edition, numerous practical rules having been added and the theoretical discussions amplified.

Steam Turbines.—DeLaval Steam Turbine Company, Trenton, N. J. Catalogue C. Describes the DeLaval velocity-stage turbine, which has only a single pressure stage and multiple velocity stages. In this turbine, which is built in all sizes from 1 to 600 hp., the steam is expanded completely from the initial to the terminal pressure in a single set of nozzles, after which it impinges upon a row of moving buckets and is then deflected to a row of stationary vanes, from which it is again directed upon a second row of moving buckets. In some cases, an additional row of guide vanes and buckets is added. The history, theory and construction of this type of turbine is given, together with a number of interesting suggestions and diagrams for the more efficient utilization of the steam consumed for driving auxiliaries

in large power stations, as well as a more efficient cycle for exhaust steam heating and drying plants. An illustrated article dealing with this feature of turbine operation appeared in *The Iron Age*, May 22, 1913.

Lathe Tools.—Ready Tool Company, Bridgeport, Conn. Catalogue No. 10. Treats of a line of lathe tools which are made in all standard types for inserted steel cutters. All of these are illustrated and briefly described and short specification tables are included. Mention is made of a number of different types of dogs for lathes and milling and grinding machines, all of which are illustrated.

Sand Blast Apparatus.—J. M. Betton, 14 Park place, New York City. Pamphlet. Contains directions for connecting and operating the Drucklieb injector sand blast, which can be used for cleaning castings of all kinds, removing paint and scale from all kinds of metal, cleaning steel before repainting and screens in cement mills. The instructions are complete and a sectional drawing of the sand blast, which, in its multiple form, was illustrated in *The Iron Age*, April 13, 1911, is included.

Pneumatic Tools and Appliances.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Three bulletins. No. 128 is concerned with miscellaneous equipment for pneumatic drills, including chucks, twist drills, reamers, augers, flue cutters and expanders, angle gears, etc. All of these are illustrated and briefly described, and a table of cutting speeds for drills is included. No. 132 contains data on the use of pneumatic motors and geared hoists, together with illustrations and brief descriptions of various types. No. 133 refers to the use of cylinder air hoists and jacks in structural, car and repair shops. The different types of hoists and jacks are illustrated with brief tables of specifications and data on the amount of air used per foot of lift are included, together with a diagram.

Screw Wrench.—Standish Tool Works, Sebago Lake, Maine. Folder. Concerned with the Nonpareil screw wrench, which is designed for holding a round-headed bolt and keeping it from turning while the nut is being tightened or slackened. Other uses of the wrench are as a pipe wrench or tongs and as a hand vise or clamp for holding parts while drilling or filing is being done. An illustrated description of the wrench appeared in *The Iron Age*, March 6, 1913.

Reinforced Concrete Buildings.—Unit Construction Company, St. Louis, Mo. Pamphlet. Deals with the Unit method of constructing reinforced concrete buildings, in which all the concrete is cast in forms on the ground in the shape of individual units which are seasoned and then assembled in place in the building as provided for in the design. A number of views of buildings constructed according to this system are shown and a couple of testimonial letters are reproduced.

Rock Drills.—Ingersoll-Rand Company, 11 Broadway, New York City. Pamphlet entitled "A Drill for Every Rock Drilling Problem." Shows the various types of drills made by this company with a brief outline of the special features of each. In general, two pages are devoted to each drill, the first giving the particular work for which it is intended, while the second contains an illustration and brief specification tables.

Surface Condensers, Centrifugal Pumps and Cooling Towers.—Wheeler Condenser & Engineering Company, Carteret, N. J. Three bulletins. The first, No. 106-A, explains the advantages of the Wheeler dry tube condenser, which was illustrated in *The Iron Age*, October 7, 1909. The details of construction of the company's surface condensers are discussed, consideration being given to such points as the shape of the shell, tube plates, tubes, packing water boxes, etc. No. 108 considers the general construction of the company's centrifugal pumps, illustrating a cross-section of a typical pump and also showing by photographs the general design of pump casing and impeller. The last, No. 109, describes the Wheeler-Balcke type of natural draft cooling tower, which was illustrated in *The Iron Age*, March 13, 1913. The bulletin is illustrated with photographs of many interesting types of natural draft towers, which are made of wood, with an improved water distributing system and compact cooling stacks which cool the water on the drop and film principle.

Quick Weight Indicator.—McFarlane Mfg. Company, 1669 Selby avenue, St. Paul, Minn. Circular. Devoted to a device for quickly indicating the load placed on a scale. This indicator can be attached without discarding any portion of the scale and can be removed if any accident should happen to the indicator withoout impairing the usefulness of the scale. It is also possible to check the weight at any time by using the beam, and if desired, the weight can be locked for recording after the load leaves the platform. An illustrated description of this indicator appeared in *The Iron Age*, March 13, 1913.

Tape Repairer.—Pittsburgh Instrument & Machine Company, 236 Third avenue, Pittsburgh, Pa. Mailing card. Calls attention to a tool for repairing steel and chain tapes. This consists of a shear for squaring the ends of the tape, a punch for making the holes and a set for fastening the eyelets in place.

Press Attachments.—Baird Machine Company, Bridgeport, Conn. Pamphlet. Illustrates the Baird system by which presses are built that are standardized for various automatic attachments, which can be attached either at the time of purchase or later, as desired. These attachments are illustrated and described at some length, and in addition, there is a view of a plain, single-action, open-back bench press, with folding paper cut-outs, showing how the different attachments are fitted to the press. Those shown are side and back roll feeds and transfer and dial attachments.

Single Direct-Acting Pumps.—Blake & Knowles Steam Pump Works, 115 Broadway, New York City. Catalog BK-876. Points out the advantages of a single pump as compared with the duplex type and touches briefly upon the important features in the Blake-Knowles single pump. A general description of the pump is given and this is followed by illustrations with brief text descriptions and specification tables of the different styles. These include boiler feed, medium and light pressure service, elevator, hydraulic, deep well and sinking, filter press, ammonia and condenser pumps and single pumps with automatic receivers. An explanation of the structural and operative features of the steam valve gear used on these pumps is given, together with points on the installation and operation of the pump. Tables of useful information are also included.

Drop Forgings.—Obenberger Drop Forge Company, Cudahy, Wis. Folder. Contains illustrations of a number of different kinds of drop forgings which this company is prepared to furnish, together with a partial list of them. Among the forgings shown or listed are crankshafts, connecting rods, gear blanks, cams, rings, valves, spindles, crane hooks, etc.

Tobin Bronze.—Ansonia Brass & Copper Branch of the American Brass Company, Ansonia, Conn. Booklet. Refers to Tobin bronze, which is a combination of copper with other metals that is remarkable for its high elastic limit, tensile strength, hardness and uniform texture. In addition to these features, it resists corrosion. Considerable information regarding the use of the metal for special purposes is given, together with scientifically procured data as to its physical characteristics. Tables of tests, instructions for ordering and using the metal and a number of testimonial letters are included.

Marine Repairs.—Goldschmidt Thermit Company, 90 West street, New York City. Pamphlet No. 34. Refers to the numerous marine repairs that have been made by the Thermit welding process and shows its advantages and economy. Information is given as to the way in which these welds are made and a list showing the progress made in marine repair work in the past ten years is given. Views of a number of the repairs are shown, and for the most part these are placed on the pages facing the reproductions of testimonial letters referring to the various jobs.

Reamers and Twist Drills.—Whitman & Barnes Mfg. Company, Akron, Ohio. Folder. Shows a number of different types of reamers, arbors and twist drills and gives brief descriptions of the different styles. Mention is also made of a reamer which reamed 14,924 holes in vanadium steel forgings without any break.

Industrial Opportunities.—Chamber of Commerce, Erie, Pa. Pamphlet. Gives an alphabetical list under the caption of the A-B-C of Erie factories of the various industries located in that city. Mention is made of some of the exports, which include boilers, castings, engines, forgings, horseshoes, locomotives, machinery, tanks, etc., and information regarding the city and its advantages for industrial plants is also included.

Coal Gas for Industrial Purposes.—Improved Equipment Company, 60 Wall street, New York City. Bulletin No. 5. Contains a discussion of the cost, advantages and uses of coal and water gas, and gives some facts about the Doherty economizer gas bench for the production of coal gas. These benches are equipped with silica retorts and settings, which are said to give better fuel economy and to hold their shape and position well.

Portable Steel Crane.—Lafayette Engineering Company, Lafayette, Ind. Two circulars. Deal with a portable steel crane for use in factories, machine shops, garages, etc., which was illustrated in *The Iron Age*, March 13, 1913. The hight and overhang of the crane are sufficient to make it adaptable for general use, and all parts are made of structural steel to insure strength. An additional safety feature of the crane is the providing of two locks for the lifting winch. A brief description of the crane is given with illustrations, showing it in use in a number of different ways.

Electrolytic Generation of Oxygen and Hydrogen.—International Oxygen Company, 115 Broadway, New York City. Pamphlet. Gives a partial list of plants in operation and construction, together with some views. A number of short testimonials are also included.

Pumps.—Goulds Mfg. Company, Seneca Falls, N. Y. Pamphlet. Calls attention to the wide-spread use of these pumps for various kinds of work. A few representative types of power pumps are illustrated and briefly described, and there are views showing a number of installations of them.

Cam or Form Milling Machines.—Garvin Machine Company, Spring and Varick streets, New York City. Circular No. 194. Relates to a line of cam or form milling machines, which are made in a number of different sizes from 6 to 36 in. All of the machines are illustrated equipped with fixtures for cutting both face and barrel cams. An illustrated description of these two fixtures as applied to the 6-in. machine appeared in *The Iron Age*, March 27, 1913.